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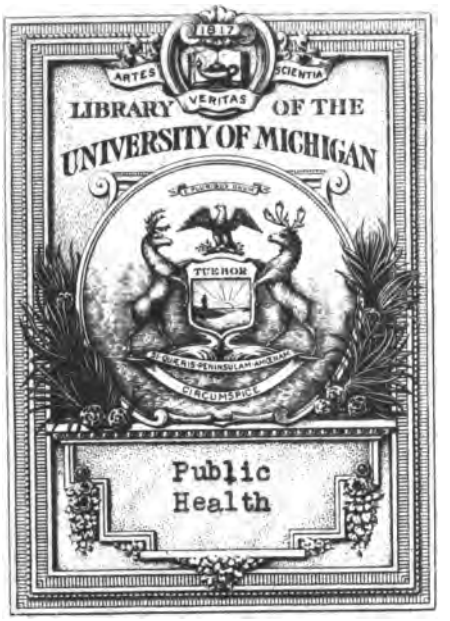
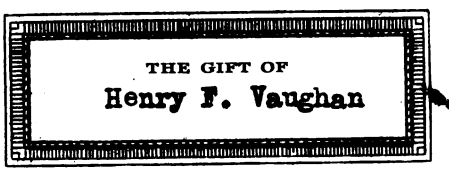
Henry F. Vaughan
Health Commissioner
Detroit.





Public Health
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TWENTIETH ANNUAL REPORT

OF THE

SECRETARY

OF THE

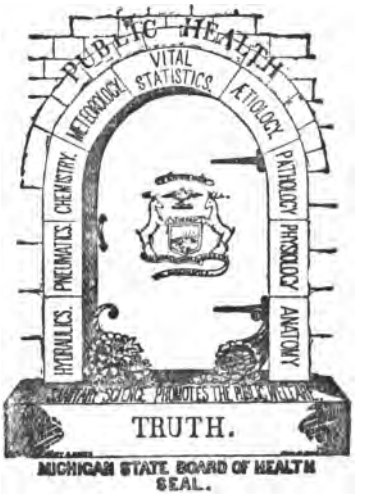
STATE BOARD OF HEALTH

OF THE

STATE OF MICHIGAN,

FOR THE

FISCAL YEAR ENDING JUNE 30, 1892.



MICHIGAN STATE BOARD OF HEALTH SEAL.

BY AUTHORITY.

LANSING
ROBERT SMITH & CO., STATE PRINTERS AND BINDERS
1894

RESOLUTION OF THE BOARD RELATIVE TO PAPERS PUBLISHED IN ITS ANNUAL REPORT.

Resolved, That no papers shall be published in the Annual Report of this Board except such as are ordered or approved for purposes of such publication by a majority of the members of the Board; and that any such paper shall be published over the signature of the writer, who shall be entitled to the credit of its production, as well as responsible for the statements of facts and opinions expressed therein.

Public Health
gift
Henry F. Vaughan
3-14-44

Office of the Secretary of the State Board of Health,
LANSING, MICHIGAN, *February, 1894.*

To HONORABLE JOHN T. RICH, *Governor of Michigan:*

SIR:—In compliance with the laws of this State, I present to you the accompanying Report for the fiscal year ending June 30, 1892.

Very respectfully,

HENRY B. BAKER,
Secretary of the State Board of Health.

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REPORT.

This is the Twentieth Annual Report of the Secretary of the Michigan State Board of Health, and is for the fiscal year ending June 30, 1892. It is arranged and paged in two parts. The *first* part contains the Secretary's report of the work of the State Board of Health, of the work in the Office of the Board, and the annual report of property, including accessions to the library, with names of donors, etc. The *second* part contains papers, abstracts, and reports—including one on the "Principal Meteorological Conditions in Michigan in 1891," one on "The Time of Greatest Prevalence of Each Disease," being a Statistical Study of the Causes of Sickness in Michigan, especially in 1891, one on the dangerous "Communicable Diseases in Michigan in 1891"—relating to Diphtheria, Scarlet Fever, Typhoid Fever, Small-pox, Measles, Whooping-cough, Consumption, Glanders, Rabies (hydrophobia), one on "Injuries and Loss of Life and Property from the Use of Kerosene," one on "Injuries and Loss of Life from the Use of Gasoline," and one on "Alleged Nuisances in Michigan in 1891."

Some of these reports include the immensely extensive and valuable statistics on the subjects of sickness, meteorological conditions, etc., collected at the office of the State Board of Health.

The publication of this Report has been much delayed by several causes, which operated before the publication of the last preceding Report, and mentioned in that Report as—including the inauguration and prosecution of new lines of work which have seemed to be demanded, and the natural increase of the work, due to increasing population of the State, and more especially to increasing attention to sanitary affairs throughout the State, the office force not having been increased correspondingly, and one valued employee having been lost by death.

Under the law, the Secretary of the Board is required to disseminate information "through an Annual Report and otherwise." Besides the

printed publications mentioned below, the Secretary is constantly employed in "disseminating information" by means of hektographed and other manuscript sent to editors of medical and sanitary journals published in Michigan, and to editors and publishers of newspapers; also by means of letters, telegrams, and telephone replies to the numerous questions asked by the thousands of officers and members of local boards of health in Michigan. Responding to these daily demands takes precedence of work on the Annual Report. The preparation of papers for use at sanitary conventions has also been permitted to take precedence of work on the Annual Report. The Annual Report, for some year, is, however, constantly in process of completion, work on it being done whenever time permits. By direction of the Board, the Secretary issues immediately after the close of each week a bulletin which shows the sickness during the week just passed; also a monthly bulletin; and sometimes publishes quarterly proceedings of the work of the Board and the condition of health in Michigan during the quarter. The proceedings of sanitary conventions are published as soon as practicable after the occurrence of each convention.

Thus items of sanitary work in Michigan which are regarded as useful "news" are published at once in the comparatively ephemeral bulletins, etc., while the Annual Report is not issued, as a newspaper or journal is, as an ephemeral publication, but as a permanent official record of the work of the State Board of Health, and in the office of the Board, and of the local boards of health throughout the State. The Annual Report contains also statistics which require a great deal of painstaking care in their preparation, but which it is hoped will be useful, for all time to come, to those who study the causation of diseases; and through their labors, to the people of the State and country; and the statistics are there preserved in a permanent form, accessible for purposes of study, to a comparatively large number of persons.

However, only about six thousand copies of the Annual Report are printed, to supply the two millions and more inhabitants of Michigan; and only 3,500 of those copies are at the disposal of the State Board of Health. Of these, some are sent to libraries, some are sent in exchange for the publications of other State Boards of Health, of prominent city boards of health, of sanitary journals, etc.; others are sent to persons likely to make good use of them, including each of the fifteen hundred health officers in Michigan.

To this Report there are three Supplements, containing proceedings and addresses at the sanitary conventions held at Negaunee, Iron Mountain and Holland.

The papers in the Supplements as well as those in this Annual Report, are printed subject to a resolution of the Board, printed on page iv.

The names and postoffice addresses of the members of the Board, and the dates of the expiration of their terms of office, are as follows:—

JOHN AVERY, M. D., *President of the Board*, Greenville, Jan. 31, 1893.
ARTHUR HAZLEWOOD, M. D., Grand Rapids, Jan. 31, 1893.
VICTOR C. VAUGHAN, M. D., Ph. D., Ann Arbor, Jan. 31, 1895.
DELOS FALL, M. S., Albion, Jan. 31, 1895.
MASON W. GRAY, M. D., Pontiac, July 1, 1897.
HON. FRANK WELLS, Lansing, July 1, 1897.
HENRY B. BAKER, M. D., *Secretary of the Board*, Lansing.

The members of the State Board of Health, with the exception of the Secretary, are appointed for the term of six years, and receive no salary or *per diem* compensation for their services.

STANDING COMMITTEES.

1. Epidemic, Endemic and Contagious Diseases.—A. Hazlewood, M. D.
2. Sewerage and Drainage.—A. Hazlewood, M. D.
3. Food, Drinks and Water-Supply.—V. C. Vaughan, M. D.
4. Buildings, including Ventilation, Heating, etc.—John Avery, M. D.
5. Climate, Geology, Topography, etc.—Henry B. Baker, M. D.
6. Disposal of Excreta.—Mason W. Gray, M. D.
7. Poisons, Explosives, etc.—V. C. Vaughan, M. D.
8. Occupations, Recreations and Habits.—Hon. Frank Wells.
9. Relations of Schools to Health.—Delos Fall, M. S.
10. Sanitary Survey.—Delos Fall, M. S.
11. The Death-Rate as Influenced by Age.—Henry B. Baker, M. D.
12. Legislation.—John Avery, M. D.
13. Finances of the Board.—Hon. Frank Wells.
14. Mental Hygiene.—Arthur Hazlewood, M. D.
15. Animals' Diseases Dangerous to Man.—Henry B. Baker, M. D.
16. Relations of Preventable Sickness to Taxation.—Mason W. Gray, M. D.
17. Plans for Model School Houses.—Hon. John Avery, M. D., J. H. Kellogg, M. D., and Arthur Hazlewood, M. D.
18. Alcoholic Liquors.—Victor C. Vaughan, M. D., and Arthur Hazlewood, M. D.

WORK OF THE STATE BOARD OF HEALTH DURING THE FISCAL YEAR ENDING JUNE 30, 1892.

Aside from the work in committees and in connection with the office of the Secretary of the Board, the work of the State Board of Health itself includes that done by means of sanitary conventions, the examination of plans and specifications for proposed public buildings, under Sec. 7, Act 206, Laws of 1881, § 418, Howell's Statutes, amended by Act 86, Laws of 1889, and work done at regular and special meetings.

SANITARY CONVENTIONS.

Three successful sanitary conventions were held during the fiscal year ending June 30, 1892, as follows:—

NEGAUNEE SANITARY CONVENTION, AUGUST 13 AND 14, 1891.

At the Sanitary Convention held at Negaunee, the following program was successfully carried out:—

Address of Welcome, by Hon. Edward C. Anthony, Mayor of Negaunee.

Response, and Statement of the Objects of the Convention, by Hon. John Avery, M. D., President State, Board of Health, Greenville.

The Germ Theory of Disease, by Hon. Frank Wells, Lansing.

Discussion, by E. J. Mellish, M. D., Ishpeming.

The Water Supply of Negaunee, by C. S. Lombard, M. D., Negaunee.

Discussion, by Alexander Maitland, Negaunee.

Diphtheria and Scarlet Fever, by Mason W. Gray, M. D., Pontiac.

Sewerage and Drainage of Negaunee, by C. F. Zukoski, E. M., Negaunee.

Disposal of Waste and Excreta in Negaunee, by C. F. Cochran, M. D., Negaunee.

School Hygiene, by F. D. Davis, Negaunee.

Restriction and Prevention of the Dangerous Communicable Diseases—From Standpoint of a Minister, by Rev. C. M. Brown, Negaunee.

Recommendations by the State Board of Health, relative to Water Supply.

Restriction and Prevention of the Dangerous Communicable Diseases—From the Standpoint of the State Board of Health, by Henry B. Baker, M. D., Secretary, Lansing.

How much ought Negaunee to pay its Health Officer? by Henry B. Baker, M. D., Secretary State Board of Health, Lansing.

Closing of the Convention.

IRON MOUNTAIN SANITARY CONVENTION, OCTOBER 30 AND 31, 1891.

At the Iron Mountain Sanitary Convention, the following program was carried out:—

Memorial from the Citizens of Iron Mountain.

Committees and Officers of the Convention.

Response, and Statement of the Objects of the Convention, by Hon. John Avery, M. D., President of State Board of Health, Greenville.

Germ Diseases, by Hon. Frank Wells, Lansing.

The Water Supply of Iron Mountain, by R. P. Tuten, Iron Mountain.

Discussion, by E. A. Ordway.

Restriction and Prevention of Typhoid Fever, by Mason W. Gray, M. D., Pontiac.

School Hygiene, by Prof. E. F. Abernethy.

Sewerage and Drainage of Iron Mountain, by O. Burlingame, C. E.

Disposal of Waste and Excreta in Iron Mountain, by E. Meyer, M. D.

Discussion, by Prof. Delos Fall, M. S., Albion.

Public Health a Public Duty, by Rev. A. E. Cook.

Restriction and Prevention of the Dangerous Communicable Diseases—From the Standpoint of a Lawyer, by Hon. M. J. Doyle.

The Restriction and Prevention of Dangerous Diseases, by Henry B. Baker, M. D., Secretary State Board of Health, Lansing.

Closing of the Convention; Remarks by Dr. Baker, Resolutions.

HOLLAND SANITARY CONVENTION, MARCH 3 AND 4, 1892.

At the Holland Sanitary Convention, the following program was successfully carried out:—

Address of Welcome, by O. E. Yates, M. D., Mayor of the city.

Response, and Statement of the Objects of the Convention, by Hon. John Avery, M. D., President State Board of Health, Greenville.

President's Address, by O. E. Yates, M. D.

The Germs of Diseases, by Hon. Frank Wells, Lansing.

Discussion of the subject.

The Water Supply of Holland, by Henry Kremers, M. D.

Germ Diseases, by Prof. Victor C. Vaughan, M. D., Ann Arbor.

Restriction and Prevention of the Dangerous Communicable Diseases—From the Standpoint of a Minister, by Rev. H. E. Dosker.

Restriction and Prevention of the Dangerous Diseases—From the Standpoint of a Health Officer, by Henry Kremers, M. D.

Restriction and Prevention of the Dangerous Communicable Diseases—From the Standpoint of the State Board of Health, by Henry B. Baker, M. D.

Alcohol and Narcotics, by Prof. G. J. Kollen, Hope College.

Discussion of the Subject, by Prof. Delos Fall, M. S., and others.

Disposal of Waste and Excreta, by J. A. Mabbs, M. D.

Discussion of the Subject, by Dr. A. Hazlewood, of Grand Rapids, and others.

Remarks by the President of the Convention.

Should Holland have Sewerage? by G. Van Schelven.

School Sanitation, by P. H. McBride.

Discussion of the Subject, by Prof. Delos Fall, and others.

The Duties and Compensation of the Local Health Officer, by Henry B. Baker, M. D., Secretary State Board of Health, Lansing.

EXAMINATION OF PLANS FOR STATE BUILDINGS, SEWERAGE, VENTILATION AND HEATING, DURING THE FISCAL YEAR ENDING JUNE 30, 1892.

Act No. 206, Laws of 1881, (§ 418, Howell's Annotated Statutes), as amended by Act No. 86, Laws of 1889, is as follows:

Plans for buildings, to whom submitted.

14. SEC. 7. That before the board of any charitable, penal or reformatory institution shall determine on the plan of any building, or on any system of sewerage, ventilation, or heating, which has been authorized by the legislature to be constructed, such plan shall be submitted to the board of corrections and charities and the State board of health for examination and opinion thereon; and the board so submitting such plan shall, in its biennial report, show to what extent it was approved by the boards so examining them. * * * That it shall be the duty of said State boards to visit said penal, charitable and reformatory institutions, when necessary to make the examinations herein required, and their official expenses necessarily incurred shall be audited by the board of State auditors and paid from the general fund.—§ 418.

The following are reports concerning plans for public buildings submitted to the State Board of Health for examination, during the fiscal year:

EXAMINATION OF PLANS FOR A COTTAGE AT THE MICHIGAN ASYLUM FOR DANGEROUS AND CRIMINAL INSANE, AT IONIA.

Report by the Secretary of the State Board of Health:

July 21, 1891, the State Board of Health held a special meeting at the Michigan Asylum for Dangerous and Criminal Insane, at Ionia, and examined plans for a proposed new cottage adjacent to the cottage already constructed. No objection was offered to the proposed site, nor to the proposed sewerage, nor to the house drainage, except that no ventilation of fixtures—to soil-pipe above highest fixture, was shown on the plans. A question was raised whether, at the main entrance, the doors should not open outward, instead of inward as shown on the plans. It was explained by Dr. Long, Superintendent, that, even if those doors were to open outward, the main entrance had only its own special key, but that provision is made for the escape of inmates, in case of fire, by way of the fire-escape, which outlet could be opened by the master key carried by each attendant.

The plans for heating and ventilation were by indirect radiation, the fresh air being conveyed, through tubes, direct from the outer air to each radiator in the basement at the foot of hot-air shafts leading to the rooms above. This was approved. The warm air is delivered in the corridors, and through open transoms to the bed rooms. In the bed rooms, and in the day rooms, the foul-air exits are at the floor level, on inside walls; and the shafts therefrom pass directly up to the attic, where each shaft is to be connected with a horizontal galvanized-iron trunk-shaft from which an upright shaft is to emerge through the roof. Of this common shaft or reservoir in the attic, this Board did not approve. It was recommended that there be no such common trunk-shaft in the attic, but that the tube from each foul-air shaft extend, separate from any other, through the roof to the outer air. If desirable to avoid so many openings through the roof, the separate tubes may be grouped, so as to pass out through the roof together, but with no more than four in a group; and the aim should be to make the conduit from each room as straight and direct as possible, and especially to avoid right angles, each right angle lessening the velocity of the current of air one-half.

Members of the Board suggested that in the day rooms (and where practicable in the bed rooms), the foul-air exits be directly under windows, the duct from each leading, under the floor, between the joists, to a shaft in an inside wall. This makes angles in the duct, but tends to prevent the drafts of cold air, which falls down the window, from sweeping across the feet of occupants of the room.

Another separate plan of heating and ventilation was submitted, and was examined by this Board. This plan was to have all the fresh air heated in one central room in the basement, then forced, by a fan blower, upward and onward through the tubes to the several fresh-air inlets in the halls and large rooms, passing through open transoms into bed rooms. The foul air to go out through registers under windows, and down through shafts to the central corridor in the basement which is to serve as a great horizontal shaft or common reservoir for foul air. The foul air in this reservoir, to be aspirated, through the draft openings to the boiler fur-

naces which are placed in the semi-detached building between the old and the new cottages, which building is to contain the kitchen and dining room for both cottages; self-closing doors being placed in the corridor near the kitchen to prevent the foul air from passing by the open-grated entrance to the furnace room and entering the kitchen, except during the time of the opening of the swinging doors. The foul air from the water-closets, to be dealt with separately, not to go to the common reservoir in the basement. The area of the outlet of the fan to be 28 by 33 inches. The area of the interior of the stack or chimney for the furnace, to be 22 by 34 inches; but to carry the smoke from the furnaces as well as all of the foul air of the building (except from closets), an automatic device being depended upon to open a small door at the foot of the stack or chimney whenever the drafts into the furnaces are closed.

Some of the objections to this plan, offered by members of this Board, are as follows:—

1. The risk of stopping the air-supply throughout the entire structure by every accidental or other stopping of the movement of the fan.

2. The great probability that to the rooms most distant from the fan the air-supply would generally be inadequate.

3. The fact that, in addition to the friction of the foul air in passing the distance required to reach the outer air above as in ordinary methods, by this plan there is the friction due to carrying the air down to the basement and back again to the level from which it started. This, it is claimed, is overcome by the fan and by the draft caused by the waste heat in the chimney; but by the plan recommended by this Board, there is no such extraordinary friction, no fan is required, and the extra expenses for the fan and for running the fan are saved.

4. The fact that on its way from the room to the basement, and throughout the basement corridor, the foul air, although colder and heavier than the air in the room from which it came, is warmer and lighter than the out-door air, consequently is liable to be displaced upward and backward into rooms from which it came by colder and heavier air pressing in through every open window or door, or opening around every window or door, and possibly to be displaced by the pressure of the heavier out-door air through the pervious walls of the foul-air shafts, thus, in some rooms, negativing entirely both the pressure (if any is caused there), by the fan, and also the effect of the draft of the chimney. At some times, through the opening of doors, etc., the entire area of the chimney may be occupied by air which has not come from an occupied room, in which case there would be no removal of foul air from any of the rooms in the manner which this plan contemplates.

This Board does not approve of this plan of heating and ventilating for this building.

The plans as a whole, including those for heating and ventilation first mentioned in this report, were, in general, approved, except as herein mentioned.

All of which is respectfully submitted.

HENRY B. BAKER, *Secretary.*

Office of the Secretary of the State Board of Health,
Lansing, Mich., July 24, 1891.

PLANS FOR A SCHOOL BUILDING AT THE STATE INDUSTRIAL HOME FOR GIRLS, AT ADRIAN.

At the meeting of the State Board of Health, held at Negaunee, August 13, 1891, the plans for a School Building, at the Industrial Home for Girls, at Adrian, submitted to the State Board of Health, for examination and opinion, under Sec. 7, Act 206, Laws of 1889, were examined, with result as follows:—

This Board recommends that a fire-place be put in the basement to supply a little heat to start ventilation at such times as when no steam is supplied to the building, and at other times when necessary.

With the above recommendation, the plans are, in general, approved.

Attest:

HENRY B. BAKER, *Secretary.*

Office of the Secretary of the State Board of Health,
Lansing, Mich., August 29, 1891.

PLANS FOR COTTAGE FOR FIFTY FEMALE PATIENTS AT NORTHERN ASYLUM FOR INSANE.

A special meeting of the State Board of Health, to examine the plans for the cottage for fifty female patients, was called to be held at the asylum in Traverse City, August 17 and 18, 1891. It was understood that if, by reason of service on committees to visit other localities, it was found not practicable for all members to be there August 17 or 18, so many as could do so, should reach there at that time and as soon as practicable thereafter. It was also voted that those who actually visited the asylum and examined the plans, were authorized to express the view of the Board.

The undersigned, the president, a member, and the Secretary of the State Board of Health, having visited the asylum at Traverse City, and examined the site and the plans for the cottage for fifty female patients, respectfully report that the site and the plans are approved.

During the examination of the plans, a few suggestions were made by members of this Board; one being that in the instances (two rooms for attendants in second story) in which no fresh-air inlet was marked on the plans, provision be made for such air supply, also for foul-air outlets, and for indirect instead of direct radiation, not relying entirely upon the entrance of air through transoms and windows.

With the foregoing suggestions, the site and plans were approved.

JNO. AVERY,
FRANK WELLS,
HENRY B. BAKER.

Office of the Secretary of the State Board of Health,
Lansing, Mich., August 29, 1891.

PLANS FOR COTTAGE FOR FIFTY FEMALE PATIENTS AT NORTHERN ASYLUM FOR INSANE. STATEMENT, BY JAMES D. MUNSON, M. D., MEDICAL SUPERINTENDENT OF THE ASYLUM.

NORTHERN MICHIGAN ASYLUM,
August 3, 1891.

To the State Board of Health:

GENTLEMEN:—I herewith submit for your approval plans for the proposed cottage for fifty female patients.

The building will consist of a basement and two stories; the foundation of stone and the superstructure of brick. Like all similar buildings constructed here, the outer walls will be laid with an air space, and the partition walls will be of sufficient thickness to give due strength to the building and contain the thermal and ventilating flues.

The site of the cottage will be north and east of the main building, in a dry, sandy soil, and on a beautiful elevation overlooking the bay and the grounds in front of the Asylum.

The sewer system will connect with the main sewer of the Asylum. The sewer-heads will be thoroughly trapped and ventilated. The plumbing, water-closet fixtures, traps, etc., will all be of most recent make, and every sanitary appliance will be of the most approved kind. The hot water will be furnished from a special heater, and the building will be warmed by a low-pressure steam-heating apparatus. The heating will be by indirect radiation. The location of the boiler and radiators, and also of the outgoing and returning steam pipes, will be explained in connection with the plans. The basement will contain only the heating apparatus. This will insure a full supply of fresh air at all times. The fresh air will be introduced to the various rooms over radiators and through flues.

The sectional area of the thermal flues for the first floor will be 25⅓ sq. ft., and for the second floor 16⅔ sq. ft. The thermal flues will be distributed as follows:

First floor.		*Second floor.*	
Dining room	6	Attendants' room	2
Vestibule	2	Bath room	1
Attendants' room	2	Bath room	2
Day room	12	Hall	2
Stairway	2	Large dormitory	12
Parlor	4	Clothes room	2
Lavatory	2	Small dormitory	4
Hall way	2		
Dormitory	2		
Clothes room	1		

On the first floor there will be two fireplaces, which will not only assist in warming the rooms, but in their ventilation as well.

The vitiated air outlets will commence wherever practicable under a window, or in a corner of a room. Each flue will be continued independently to the open air above the roof. They are located as follows:

First floor.		*Second floor.*	
Dining room	5	Attendants' room	2
Attendants' room	1	Small dormitory	6
Day room	9	Large dormotory	13
Parlor	4	Bath room	2
Lavatory	2	Water closet	1
Water closet	1	Clothes press	1
Hall	1	Bath room	1
Dormitory	3	Clothes room	3
Clothes room	1		

The sectional area of the vitiated air outlets for the first floor, exclusive of fire places, is 22 ½ sq. ft.; of the second floor, or dormitories, 31 ½ sq. ft. I will not attempt to demonstrate mathematically how often the air of this building will be changed, but the ventilation will be at all times sufficient to prevent dangerous saturation of the room with carbonic acid gas.

The heating of the building is based upon an estimate of one square foot of radiating

surface to sixty cubic feet of space to be warmed. The cubic capacity of the cottage, exclusive of kitchens and store rooms, will be 110,676 ft., or 2,049 cubic ft. to each of 54 persons. Assuming that 40 cubic ft. is a fair average of fresh air required for each person per minute, the air will need to be changed about once an hour in the building to keep it pure. As shown above, the aggregate sectional area of thermal flues is 42 sq. ft. Warm air at a temperature of from 80 to 100 deg. has a velocity of about 4 ft. per second through a brick flue one ft. square. Multiply 42 by 4 and we find that we can supply 168 cubic ft. of pure warm air per second, or 604,800 cubic ft. per hour. At this rate a complete change of air will be afforded about once in twelve minutes.

The aggregate sectional area of the vitiated air outlets as above stated, is 53½ ft. Assuming an outward current of air at 2 ft. per second for an ordinary brick flue one ft. square, it will afford an outgoing current of 107 ft. per second, or 375,200 cubic ft. per hour. This will empty the building of air once in every 36 minutes.

The building will be supplied with water from the Asylum well, and will be lighted from the electric plant now in use. The laundry work will be done at the main building. The building will be finished inside to correspond with the cottages previously built. For details of construction, and for methods of carrying out system of ventilation, methods of plumbing, etc., etc., you are respectfully referred to the infirmaries built here two years ago.

All of which is respectfully submitted.

JAMES D. MUNSON,
Medical Superintendent.

EXAMINATION OF PLANS FOR A "COLONY COTTAGE" UNDER PROCESS OF CONSTRUCTION AT THE MICHIGAN ASYLUM FOR INSANE, KALAMAZOO.

At a special meeting of the State Board of Health, at Holland, March 3, 1892, the specifications and the blue-print plans of the Colony Cottage were examined. Recommendations were made as follows:—

To the proposed grouping of the foul-air flues there is no objection, provided each foul-air flue shall go, separate and distinct from any other, to the outer air.

This Board recommends that the Gold pin radiators in the basement receive the fresh air through flues connected with them, and extending to the outer air; and that if rooms in the basement are used as fresh air receiving rooms, they be used for no other purpose whatever.

In the dormitory, 19x12½ feet, the fresh air inlet, 4x12 inches, should be at least doubled; and the foul-air outlets in this room, and in all cases, should equal the fresh-air inlets.

Unless the ventilating pipe from each trap is more than one and one-half inches in diameter, the McClellan trap-vent is recommended to be used.

The water closets should be ventilated by flues separate and distinct to the outer air.

On motion, the plans and specifications were approved with the foregoing recommendations.

SPECIFICATIONS RELATIVE TO THE COLONY COTTAGE UNDER PROCESS OF CONSTRUCTION AT THE MICHIGAN ASYLUM FOR THE INSANE, KALAMAZOO.

This cottage is intended for a mild class of male patients, most of whom are chronic cases. The building is brick with extreme dimensions of 120x56 ft., exclusive of porches, and consist of basement and three stories. The wood-shed shown in the accompanying ground plan, was by direction of the State Board of Charities, abandoned. The basement or cellar extends under the entire building. It is 8 ft. high in the clear with floor of cement throughout. Walls are of stone, the first three feet laid in cement.

The room immediately under the kitchen, 24x20 ft. in dimension, will be used for a boiler room. The room immediately under the washroom and closet will be used as a boot-room. Patients coming in from out-door work will pass through this room where

they will exchange their boots and working blouses for slippers and in-door coats. This room has a ventilating shaft passing through the roof and will be warmed by direct radiation.

Other heating will be by the indirect system. All other rooms in basement can be used as cold air chambers, and in them will be located the Gold pin radiators. If deemed best air can be introduced through trunk flues to the radiators.

The first story, the plan of which accompanies this, contains vestibule, hall, attendants' room, sitting-room, dining-room, kitchen, pantry, store-rooms, lavatory, bath-room and water-closet; the location and sizes are shown in the plans. This story is 11 ft. in the clear. The second floor is occupied by hall, attendants' rooms, and dormitories for patients. This story is 10½ ft. in height and will accommodate beds for 32 patients. The third story, 10 ft. in height, will, in addition to hall and room for attendants, accommodate in dormitory space 28 beds.

Each room in the house intended for living or sleeping purposes with the exception of one small dormitory and a small sitting-room on the first floor, contains a fire-place in which, if necessary, can be built an open grate fire. These chimneys, 8 inches square, will afford ventilation for each room that is not additionally provided with ventilating shafts. In addition to the fire-place, each room having a floor space greater than 15 ft. square, has a ventilating shaft in the wall. These shafts will be collected in the attic in groups of three into a common flue which they will enter at different heights, and through that the foul air will be conducted out through the roof. The rooms are warmed by hot air coming through conduits 4x12 inches in size; the register openings which are 8 feet from the floor, will not be obstructed by gratings. The floors will be of oak and the finishing of white wood.

The water-closets will be supplied with diamond hoppers, flushed from automatic tilting cisterns which will be supplied with water from an elevated tank. The plumbing will be done by the asylum engineer and appropriately trapped and ventilated. The waste will be carried through a sewer to a place twenty rods distant to the side of the farm barn opposite the house, where it will be composted with the barn yard waste and used as fertilizer on the farm.

As before stated, this cottage will be occupied by a mild class of patients, many of whom will assist to some extent in the farm work and all will be able to enjoy the privilege of going about the premises unattended.

WM. M. EDWARDS,
Medical Superintendent.

ADDITIONAL SPECIFICATIONS.

MICHIGAN ASYLUM FOR THE INSANE,
Kalamazoo, Mich., Feb. 15, 1892.

DR. HENRY B. BAKER, *Secretary State Board of Health, Lansing, Mich.:*

DEAR DOCTOR:—Your letter of February 10 is at hand.

I send you herewith blue print of the basement of our proposed colony house. You will observe that the rooms in the anterior part of the basement communicate one with another. The room in which the boiler will be located will be closed tightly with doors.

The boot-room, as before stated, will be ventilated through the roof. The water-closets will be ventilated by a shaft running through the roof. The traps will be ventilated by pipes running through the roof. The ventilating shafts are 4x12 inches in size. The chimneys, as before stated, are 8 inches square. On the plans heretofore sent you, the location of fresh air inlets in represented thus |——| and of the ventilating shafts thus | |. The dormitory, 19 ft. x 12 ft. 6 in., is supplied by one fresh air inlet, size 4x12 inches, and through which warmed air will enter, and is ventilated by one outlet of the same size.

I shall be pleased to furnish any other information regarding the plans that you may desire.

I am very truly yours,

WM. M. EDWARDS,
Medical Superintendent.

MEETINGS OF STATE BOARD OF HEALTH, FISCAL YEAR, ENDING JUNE 30, 1892. ABSTRACTS AND BRIEF ACCOUNTS OF THE PROCEEDINGS.

REGULAR MEETING AT LANSING, JULY 14, 1891.

The meeting was called to order by President Avery. The following members were present: Hon. John Avery, M. D., Greenville; Arthur Hazlewood, M. D., Grand Rapids; Victor C. Vaughan, M. D., Ann Arbor; Hon. Frank Wells, Lansing; Mason W. Gray, M. D., Pontiac; and Henry B. Baker, M. D., Secretary, Lansing. Prof. Delos Fall, M. S., Albion, was present at the afternoon session.

The minutes of the regular meeting April 14 were read, corrected, and approved; the correction being where they read that Dr. Hazlewood was appointed as delegate to the American Medical Association, it should read Dr. H. F. Lyster instead of Dr. Hazlewood.

State Board of Health vouchers numbers 2025 to 2054, inclusive, were allowed.

The Secretary read a letter from Dr. James D. Munson, Superintendent of the Northern Asylum for Insane, Traverse City, in which Dr. Munson asked that this Board meet at Traverse City to examine the plans and specifications for a proposed new cottage.

Dr. Vaughan moved and it was voted that a special meeting be held at Traverse City for the purpose of the examination of the plans and specifications for the proposed new building; and, if the members of the Board were not all present, those who were there act for that purpose.*

The Secretary presented and read a letter from Sarah J. Herrick, clerk of the Industrial Home for Girls, at Adrian, asking this Board to examine plans for a proposed school building.

Dr. Vaughan moved and it was voted that a special meeting be held at Adrian to examine the plans and specifications for the proposed new building; and, if the members of the Board are not all present, those there act for the Board.†

Dr. Vaughan reported that he had received a can of currants, which were thought to have caused the poisoning of a family in Lapeer, and that he had tested the currants in every possible way. The currants were tested for inorganic and organic poisons, for ptomaines and bacterial proteids, and for poisonous germs, all without effect. Aqueous extracts were injected into animals without effect. It was supposed that some of the arsenic that was used on the bushes got into the currants and was canned, thus causing the poisoning. It seems very evident that the poisoning must have come from some other food. I have been unable to find any poison, and I have done a great deal of work on the analyses as I was anxious to find some poison. The dead bodies of the persons should have been examined. I think the members would be interested in this alleged case of poisoning, and I wish that Dr. Baker would read Dr. Tinker's letter.‡

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* The report upon the examination of the plans and specifications of the proposed new building at Northern Michigan Asylum, is printed on page xiv of this report.

† The report on the plans and specifications for the proposed new building at the Adrian School for Girls is printed on page xiv of this Report.

‡ The letter was read. It will probably appear in the last part of this volume, under the head of Alleged Poisoning by Canned Fruit.

On motion of Dr. Baker, it was voted that the Secretary be authorized to print the proceedings of the meeting July 14, 1893.

Dr. Baker presented and read the two-page leaflet "Dangerous Contagious Diseases," and proposed that the leaflet be reprinted, and translated into other languages and printed, explaining that it would save much other printing of pamphlets (larger than this one) for distribution. Several amendments were made, and the Secretary was directed to print 10,000 copies of the leaflet in the English language.

AFTERNOON SESSION, 1:30 P. M.

With the addition of the name of Prof. Fall, the same members were present in the afternoon session as were present at the morning session.

The Secretary presented the subject of the revision of the pamphlet on the restriction and prevention of measles. He stated that, in accordance with the vote of the Board, he had revised the pamphlet, and had sent copies of the revision to each member of the Board. The subject was then thoroughly discussed as to the use of the pamphlet, and as to each paragraph in the pamphlet. Many amendments were made, some portions were stricken out, the pamphlet as amended was adopted, and the Secretary was directed to add a paragraph relative to Dr. Farr's law, something as follows:—Michigan is rapidly coming to be more densely inhabited. Other sanitary conditions remaining the same the death-rate from communicable diseases increases directly as the population increases.

On motion of Dr. Vaughan it was voted that the pamphlet on the restriction and prevention of measles be printed to the number of 5,000 copies.

The following table was presented and read by the Secretary:

TABLE.—*Exhibiting the number of Health Officers in Townships, Villages and Cities in Michigan for 1890-1, also the per cent of Health Officers in each class of localities, and in the State, who were Physicians.*

Health Officers.			
	Totals.	Physicians.	
		No.	Per Ct.
Of townships	1,064	545	51.2
Of villages	226	211	* 93.4
Of cities	55	55	100.0
In the State	1,345	811	60.1

* The law requires that the health officer of every city and village shall be a "well educated physician." This law seems not to have been complied with by the villages of Essexville, Tekonsha, Clio, Pewamo, Metamora, Otter Lake, Morley, Mc Bride, Pierson, Croton, White Cloud, West Branch, Grosse Pointe, Trenton and Manton.

The Secretary presented and read the proposed pamphlet on the restriction and prevention of consumption. It was ordered printed to the number of five thousand copies.

Sanitary Conventions.

The Secretary presented invitations for this Board to hold Sanitary Conventions at Holland, Charlotte, Manistique, Negaunee and Red Jacket.

Dr. Hazlewood thought the Board ought to make arrangements with Negaunee soon, Holland later in the fall, and Charlotte after Holland.

Dr. Vaughan thought that the Board could hold two or three conventions, by holding one at one central place in the upper peninsula, and by so doing please several cities.

Dr. Baker was in favor of going to Holland and Charlotte, but, if there was to be a convention in the Upper Peninsula he thought it should be at Negaunee, for they surely needed a convention. The following named members said they would probably be able to go to Negaunee sometime in August: Prof. Fall, Drs. Avery, Hazlewood, Gray, Baker, and Mr. Wells.

On motion it was voted to direct the Secretary to make arrangements for sanitary conventions at Negaunee, Holland and Charlotte, in the order named; but the foregoing motion was reconsidered and amended, and by vote of the Board Prof. Fall was directed to go to Negaunee and make arrangements for a sanitary convention, and while there to look over the ground for a proper source of water-supply.

The Secretary presented and read a letter from Dr. Davis, of Grand Ledge, asking this Board to grant a permit for the removal of a body dead from diphtheria since January 5, 1891, from Kalamazoo to Grand Ledge. The letter was presented to the Secretary by a nephew of Dr. Davis. The nephew stated that they were anxious to get the permit and would do most anything the Board required; if necessary, they would go across the country with the corpse. The subject was discussed, after which it was moved that Dr. Davis be requested to wait one year, which motion prevailed.

The Secretary presented preambles and resolutions which were unanimously adopted, as follows:—

WHEREAS, This being the first meeting since the termination of the services of Drs. Lyster and Kellogg, as members of the State Board of Health, it is an appropriate time to place upon record our high appreciation of the value of their services; therefore,

Resolved, That the eighteen years gratuitous services of Henry F. Lyster, A. M., M. D., as a member of the Michigan State Board of Health, entitle him to the gratitude of the people of Michigan; that through his labors on the Board and in its Committees, especially the committee on "epidemic, endemic and contagious diseases," his voice and pen have done excellent service in molding and sustaining that part of the public-health work of the State which relates to the restriction and prevention of those important diseases; that we do not forget that although the bill which he drew was not the one which became the act establishing that Board, it was largely in consequence of his efforts, as a special committee, that the present effective board of health for the city of Detroit was established by the Legislature in 1881; that in connection with the Sanitary Conventions under the auspices of this Board, his numerous papers read, impromptu discussions, and public addresses—on the sanitary drainage of land, sewerage and house-drainage in cities, the use of alcoholic liquors, and on other topics, have done much toward the formation of public opinion on many sanitary subjects.

Resolved, That the Secretary of this Board be directed to transmit a copy of these resolutions to Mrs. Lyster, and to express the hope of the members of this Board that Dr. Lyster may return from his present trip in Europe in good health, and may long continue, as we have known him to be—the philanthropic physician and sanitarian.

Resolved, That the vigorous sanitary work of Dr. John H. Kellogg, during the twelve and a half years that he has been a member of the Michigan State Board of Health, is work of which any man might well be proud, and all the more because a considerable proportion of it has been done in committee and otherwise under such circumstances that general public recognition of it was impossible, work which has led to the improvement of the ventilation and sanitary condition of many public and private buildings, and has conduced to the general up-building of sanitary progress throughout the State. Dr. Kellogg's experience in the planning, construction, and use of buildings for many inmates, and his conference with architects and others concerned in the planning and construction of buildings for the various State institutions whose plans have come

before this Board for examination and report, have made him especially useful to the State in the examination of plans for public buildings, his advice on these subjects has been especially valuable. His public addresses and discussions at the sanitary conventions throughout the State, are well known. The people of Michigan are richer in money, health and life, because of the faithful gratuitous labors of Dr. John H. Kellogg, as a member of this State Board of Health.

The subject of additional clerical force in the Office was presented, discussed, and the Board voted that Mr. Wells, Dr. Avery and Dr. Baker be a committee * to investigate the present work of the clerks and the need of additional clerks, and to report at the next meeting of the Board.

Upon suggestion of the Secretary the Board voted to print 6,000 copies of the pamphlet on the "Work of Health Officers and of Local Boards of Health," 300 copies of the four-page leaflet "Petition for Abatement of an Alleged Nuisance," 10,000 copies of the pamphlet on the "Restriction and Prevention of Scarlet Fever," 10,000 copies of the "Restriction and Prevention of Diphtheria."

The Secretary read a report on Legislation in Michigan in 1891, and the report was accepted and placed on file.

It was voted that Secretary Baker attend the meeting of the American Climatological Association at Denver in the interests of public health in Michigan.

On motion it was voted that Mr. Wells be asked to represent the Board at the meeting of the Michigan Business Men's Association, in case there was a meeting this year.

Dr. Baker presented a paper embodying the results of an investigation by a Fellow of the Royal Meteorological Society of England, showing that in England the great epidemic which culminated in the week ending January 17, in more than double the ordinary deaths from diseases of the respiratory organs, came during what the English scientist calls "The Great Frost of 1890–1891," concerning which he says "so far as the southern portion of England is concerned, there does not seem during the last century to have been any such prolonged period of frost as that of 1890–91." That is, the meteorological conditions have been as exceptional as have the sickness and deaths from respiratory diseases. Dr. Baker said he thought there is no doubt that we now have the facts proving what are the controlling factors in the causation of these diseases. He exhibited a diagram relating to the meteorological factors. On motion the foregoing was voted to be published in the proceedings. (But, because of press of work, the proceedings of this meeting were never published. The article in the Quarterly Journal of the Royal Meteorological Society is to be found on pages 93 to 117 inclusive, of Vol. xvii., being a paper read Feb. 18, 1891, by Charles Harding, F. R. Met. Soc., and the discussion following the paper.)

The Secretary presented his Property Report for the year ending June 30, 1891,† also his report of work done in the Office of the Secretary during the quarter ending June 30, 1891.‡

On motion the Board adjourned.

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* The report of this committee is printed on subsequent pages of the "First" part of this Report.

†The Secretary's Annual Report of Property for the year ending June 30, 1891, is printed on pages lxxxvi-xcix of the Report of this Board for 1891.

‡ The Secretary's Quarterly Report of Work in the office during quarter ending June 30, 1891, is printed on pages lxv-lxix of the "First" part of the Report of this Board for 1891.

SPECIAL MEETING AT IONIA, JULY 21, 1891.

The Board met pursuant to a call (made by the Secretary, by order of the President, July 17, 1891) for the purpose of examining plans for a new building, proposed to be built at the Michigan Asylum for Dangerous and Criminal Insane.

The following named members were present: John Avery, M. D., President, Arthur Hazlewood, M. D., Mason W. Gray, M. D., Hon. Frank Wells, and Henry B. Baker, Secretary.

Careful examination and consideration of the plans submitted to the Board at this meeting, resulted in the report made thereon, by the Secretary of the Board. [It is printed on page xii of this Report.]

SPECIAL MEETING AT NEGAUNEE, AUGUST 13 AND 14, 1891.

The plans for a School Building, at the State Industrial Home for Girls, at Adrian, were examined August 13, and the Report of the examination is printed on page xiv of this Report.

The Secretary presented letters from Dr. Scallon, the president of the village of Hancock, requesting the advice of this Board, or a committee of the Board, on the subject of the proposed water-supply of that village; also other communications asking that a committee visit Red Jacket and Calumet.

The Board voted that a committee of three be appointed to visit Hancock, and perhaps Red Jacket and Calumet. The committee was as follows: Dr. Baker, Mr. Wells and Prof. Fall.

Communications were presented, from A. J. Braden, M. D., health officer of Baraga, asking for a committee of this Board to visit Baraga and investigate an outbreak of typhoid fever. On motion, Drs. John Avery and Mason W. Gray were appointed as such committee.

The Board adjourned, subject to call of the president.

August 14, about 8:30 A. M., the President called the Board to order, and State Board of Health vouchers numbers 2063 to 2071 inclusive, were presented and, after consideration, allowed. (The vouchers for the expenses of members of this Board, in attending this meeting, and while serving on the committees appointed at this meeting, were allowed at the several amounts to be certified to by each member after returning home, the vouchers then to be sent and endorsed by the President and Secretary of this Board.)

After the auditing of bills, the Board adjourned, subject to the call of the president.

August 14, about 9:30 p. m., the Board was called to order again, and listened to a report of the special committee who, during that day, had visited Baraga to investigate the outbreak of typhoid fever. The report was as follows:

INVESTIGATION OF OUTBREAK OF TYPHOID FEVER IN BARAGA, MICHIGAN.

Preliminary Report and Recommendations.

The undersigned, a committee from the State Board of Health, at the request of the Health Officer of Baraga, visited that village for the purpose of investigating the cause of the prevailing epidemic of Typhoid Fever, and are fully convinced that the principal cause exists in the water supply; and would recommend

1. The extension of the water main to beyond Sand Point, and into deep water far enough to avoid the shore current.

2. That all existing privy vaults be filled up, and that cement vaults be made, and the dry-earth system be adopted, and that, as soon as possible, the entire village be thoroughly underdrained; and

3. Until such time as these improvements can be made, that all drinking water be boiled.

JNO. AVERY,
MASON W. GRAY,
Committee.

On motion, the foregoing recommendations were approved by the State Board of Health, and the president and secretary were directed to endorse them to that effect.

The Board then adjourned.

HENRY B. BAKER,
Secretary.

SPECIAL MEETING AT TRAVERSE CITY, AUGUST 17 AND 18, 1891.

Dr. Munson, Medical Superintendent of the Northern Asylum for Insane, at Traverse City, having informed the Secretary of this Board that plans for a new building at that institution were ready for examination, a meeting of the Board was called, by the President, to convene at Traverse City, August 17 and 18, 1891, for the purpose of examining said plans.

At a special meeting of the Board held at Negaunee, August 14, 1891, committees were appointed to visit various localities in the Upper Peninsula, to investigate and report on the water-supply, and causes, etc. of epidemics at those localities; and it was understood that if, by reason of service on said committees, it was found to be impracticable for all the members to be at Traverse City, August 17 or 18, so many as could do so, should reach there at that time and as soon as practicable thereafter. It was also voted at said meeting, that those members who actually visited the asylum, and examined the plans were authorized to express the view of the Board in regard to said plans.

Acting on the foregoing decisions of the Board, Doctor John Avery, President; Hon. Frank Wells, Member; and Doctor Henry B. Baker, Secretary, of the Board, visited the asylum at Traverse City, and having examined the site and the plans for a proposed cottage for fifty female patients there, made a written report. [It is printed on page xiv of this Report.]

REGULAR MEETING LANSING, OCT. 13, 1891.

The members present at the meeting of the State Board of Health at Lansing, Oct. 13, 1891, were Prof. Vaughan, Prof. Fall, Dr. Gray, Mr. Wells and Dr. Baker.

The Secretary presented letters from the mayor and others, and a numerously signed petition from citizens of Iron Mountain, setting forth that their city is suffering from a serious epidemic of typhoid fever, 436 cases and 32 deaths* from typhoid fever having occurred from Aug. 7, to Oct. 6, 1891, and asking that the State Board hold a sanitary convention there, for the purpose of aiding the citizens in stamping out the epidemic, and stating that Iron Mountain had raised $250 for defraying the expenses of such convention. Although petitions for conventions at Holland and at Charlotte had precedence of this one, on account of the very serious

* This was afterwards found to be an erroneous report, the actual numbers being less than these.

situation at Iron Mountain, the Board decided to accept the invitation and hold a convention there October 30 and 31.

The Board also appointed a committee* to investigate an outbreak of diphtheria at Imlay City and vicinity from which upwards of 70 cases, and 14 deaths are reported to have occurred since August, 1890.

The Secretary presented a report of typhoid fever in Deerfield township where about 26 cases and 7 deaths have been reported since August 20, 1891.

Correspondence relative to a suspected case of leprosy in Michigan was presented, and also the reported casualties from kerosene oil during the past quarter.

In his report of work done during the quarter, the Secretary mentioned that the Office had received notice of and taken action relative to 492 outbreaks of dangerous communicable disease during the quarter, and 1,120 letters had been written.

Dr. Baker stated that, although the statistics show that through health measures—chiefly isolation, disinfection and vaccination—there has been recently a reduction of at least eleven hundred deaths per year in Michigan from the three diseases, small-pox, scarlet fever and diphtheria, there still remained seven thousand deaths per year from diseases known to be preventable through measures the knowledge of which is being spread by the State Board of Health. He thought that an increase of the same work which has contributed to cause the reduction would be the most profitable use to which the people of Michigan could put a few thousand dollars, and that a further reduction in the deaths can be made by the constant employment of more persons in health work, one or two of whom could be employed by the State, to good advantage.

Prof. Vaughan spoke of one line of work which seemed to be specially needed,—an inspector to visit and aid localities in preventing the spread of dangerous contagious diseases. Typhoid fever and diphtheria are epidemic in places too numerous to be visited by members of this Board, who, if they go, must leave their own business to work for the public without compensation. Something is being done now, but more ought to be done than can be done by members of the Board.

AN ADJOURNED MEETING, IRON MOUNTAIN, MICH., OCTOBER 31, 1891.

The meeting was called to order by the President at the Commercial Hotel. The following members, sufficient to form a quorum, were present: John Avery, M. D., President, Greenville; Victor C. Vaughan, M. D., Ann Arbor; Prof. Delos Fall, M. S., Albion; Mason W. Gray, M. D., Pontiac; Hon. Frank Wells, Lansing; Henry B. Baker, M. D., Secretary.

State Board of Health vouchers numbers 2103, 2104 and 2105 were allowed.

The Secretary submitted communications he had received from Dr. J. L. Elliott, of Bay City, enclosing statement by Dr. E. A. Hoyt, relative to a case of poisoning by coffee. After consideration of the subject, Dr. Vaughan said that if a sample of the coffee, which was supposed to have caused the poisoning, were sent to him, he would have it analyzed, free of cost to the Board, or the parties concerned at Bay City. Further action of

*The report of Doctor Mason W. Gray, as the committee appointed to investigate this outbreak of diphtheria, is printed on subsequent pages of this Report.

the Board in regard to this matter was then postponed until after said analysis had been made.

The Secretary submitted a letter he had received from Dr. Stiles Kennedy of St. Louis, Michigan, embodying an invitation from the city council of that city, for this Board to hold a sanitary convention in their city some time in the near future. The Secretary was instructed to inform Dr. Kennedy that the Board accepted the invitation, and would hold a sanitary convention at St. Louis at the earliest opportunity; that similar invitations had previously been received from Holland and Charlotte, where conventions would be held before that at St. Louis; but that, as the limited appropriations of the Board would not admit of any more conventions being held this year, all would necessarily be deferred until early in 1892.

By unanimous vote, Dr. Vaughan was requested to prepare, and submit for approval of the Board, reports on the sanitary conditions and water supplies of Iron Mountain and Norway.

It was moved and carried that the proceedings of the Sanitary Convention, held at Iron Mountain, be printed in the usual form of proceedings of such conventions.

HENRY B. BAKER,
Secretary.

REGULAR MEETING, LANSING, JANUARY 12, 1892.

The Board was called to order by the President at 10:20 A. M. The Secretary called the roll, and the following named members were present: Hon. John Avery, M. D., Greenville; Mason W. Gray, M. D., Pontiac; Hon. Frank Wells, Lansing; Henry B. Baker, M. D., Lansing; and Prof. Delos Fall, M. S., of Albion, came in at 11:20 A. M.

The minutes of the regular meeting of Oct. 13, 1891, were read and approved.

The minutes of the meeting held at Iron Mountain, Oct. 31, 1891, were read and approved.

A letter from Dr. Hazlewood, expressing a doubt about being able to attend this meeting of the Board, was read by the Secretary.

State Board of Health vouchers numbers 2096 to 2121, inclusive, were allowed, except 2103, 2104 and 2105.

Under the head of brief announcements of business to be brought before the Board at this meeting, Mr. Wells said that he had a report* to make of the committee which was appointed by the Board to investigate the work of the present clerks, and the need for additional clerical force.

The Secretary read a brief list of items of business which he wished to bring before the Board at this meeting.

The Secretary presented and read his report of work done in the Office during the quarter ending Dec. 31, 1891.

The Secretary presented a call for a Conference of representatives of State and Municipal Boards of Health, at Chicago, January 14, 1892, for the purpose of arranging a uniform plan for presentation of their objects and work at the "World's Columbian Exposition." Also several letters from Benjamin Lee, M. D., Secretary Pennsylvania State Board of Health, relative to the same subject.

*The Report of the Committee appointed to "Investigate the Work of the Office" is printed on subsequent pages of this Report, page xxxviii.

Mr. Wells inquired if the expense of the exhibit would have to be taken out of the regular appropriation for this Board, or would it be taken from the legislative appropriation for Michigan's Exhibit at the World's Fair? He thought that this Board should use a part of the legislative appropriation, just as much as other departments.

Dr. Baker understood that $1,000 was apportioned to the office of the Superintendent of Public Instruction, to defray the expense of more clerk hire, on account of the extra work required to get ready for the exhibit.

On motion of Mr. Wells the Secretary was directed to confer with the secretary of the World's Fair Commission to see how much of the legislative appropriation could be obtained for the use of the State Board of Health in preparing an exhibit for the World's Fair.

On motion of Dr. Gray it was voted that this Board appoint a delegate to attend the conference of Sanitary Officials, at Chicago, January 14, 1892, and that the expenses of the delegate, incurred in attending the meeting, be allowed by the Board.

On motion Dr. Baker was appointed as such delegate.*

The Secretary read an invitation to this Board to attend the exercises at the opening of the Michigan University Hospital, Ann Arbor, Mich., Jan. 20, 1892. On motion of Dr. Gray the invitation was accepted, and it was understood that as many of the members, as possible, should attend the exercises, but not at the public expense.

The Secretary received and read a telegram from Dr. Vaughan saying that it was impossible for him to attend this meeting of the Board.

The Secretary read a number of letters of applications and recommendations for clerkships in the office.

Dr. Baker made remarks relative to the need of more clerical help in the office.

On motion the Board took a recess from 12:08 until 1:30 P. M.

Afternoon Session, January 12, 1892.

The members present were Prof. Delos Fall, Mason W. Gray, M. D., Hon. Frank Wells and Dr. Henry B. Baker.

The Secretary presented a revised copy of the pamphlet on the "Work of Health Officers and Local Boards of Health," and requested that 6,000 copies of the revised edition be printed, and, on motion, the Secretary was directed to print 6,000 copies of the pamphlet.

The Secretary presented a revised copy of the pamphlet on the "Restriction and Prevention of Typhoid Fever," and read the proposed amendments, and, on motion, he was directed to print 10,000 copies of the pamphlet.

Prof. Fall spoke of a conversation that he had had with a Mr. Almendinger, of Ann Arbor, relative to the appointment of a Dairy and Food Commissioner, a Deputy Commissioner and a State Analyst. Mr. Almendinger wished the Board to coöperate with the Fruit-Growers' Association

* At the April, 1892, meeting of this Board, Dr. Baker made a verbal report of his attendance at the Chicago Conference of Sanitary Officials and his report will be found printed in connection with the proceedings of the meeting of April 12 on subsequent pages of this Report, page xxxiii-iv.

in an effort to get a law passed which should provide for such officers. On motion of Dr. Gray, Prof. Fall was appointed a committee to confer with the Fruit-Growers' Association.

Mr. Wells presented and read the report* of the committee appointed to investigate the work of the Board.

On motion of Prof. Fall, the report as read by Mr. Wells, was adopted.

Mr. Wells then read a criticism on the sickness statistics that are collected and collated by this Board.

Mr. Wells remarked that the criticism just read had been replied to by Dr. Baker, and Dr. Baker would now read his reply. He also said that the criticism and reply were not a part of the report of the committee to which all members of the committee had agreed.

Dr. Baker then read his reply.

Prof. Fall suggested that the criticism and reply were too valuable to die on the table, and should be printed in the Report.

Dr. Gray said that Dr. Baker's reply was a very complete one, and should be published.

Mr. Wells said that his criticism was not on the collection and collation of sickness statistics, as he thought that was a valuable work; but what he wished to criticise was the way in which the statistics were collected, and said that he was not convinced by the exhibition of diagrams and tables.

By permission of the Board Dr. Baker read a three-page argument for more help in the office, in which he contrasted the expenses and the amount of good done by the Detroit Board of Health and the Michigan State Board of Health.

Prof. Fall said that he could sympathize with the view which Mr. Wells had expressed in regard to the collection of the sickness statistics; but, through the work in his class in sanitary science, he had studied the diagrams, and for himself, he was ready to accept the report in accordance with Dr. Baker's plea. Prof. Fall also said "I have the greatest respect for the accuracy and value of these statistics. They are sent and used in foreign countries, and have established a reputation for this Board. I am glad that this criticism has come out, as it leads to discussion and consequently more interest in the work of the Board."

On motion of Prof. Fall it was voted that Dr. Baker and Mr. Wells weave their report and discussions into one, and get something ready for publication. [Dr. Baker's article on "Sickness Statistics" was afterwards read before the National Conference of State Boards of Health, and was ordered published in this Annual Report. It is printed on subsequent pages.]

On motion of Prof. Fall it was voted that it was the sense of the Board that there should be more help employed in the office.

On motion it was voted that the committee on the work of the Board be authorized and instructed to employ two or three more clerks, as the committee might deem necessary.

Prof. Fall spoke about work he had been doing in testing samples of kerosene oil. Out of 24 samples, 22 flashed below the present standard test; the remaining two were above the old test, and he was glad to say that they came from Mr. Wells' stock. Prof. Fall said: "The Standard Oil Co. are putting this bad oil in the State, and are sending a chemist around the State to instruct the deputy inspectors how to test oil, and just

* This report is printed on subsequent pages of this Annual Report.

how to hold the match in testing, and by so doing vary the results several degrees either way they may desire."

The Secretary presented letters from Drs. Hewitt, Secretary of the Minn. Board; Reilly, Secretary of the Illinois Board, and John D. Ware, Health commissioner of Chicago, endorsing the action of this Board relative to the inspection service, at the eastern border of Michigan. Also a letter from Dr. Walter Wyman, Supervising Surgeon General U. S. Marine Hospital Service, stating that the inspection service at Detroit and Port Huron had been discontinued.

The Secretary presented the subject: "Is there arsenic in kerosene?" but no formal action was taken by the Board.

On motion the Board adjourned at 5:30, P. M.

SPECIAL MEETING, AT HOLLAND, MARCH 3, 1892.

The meeting was called to order, at 2 P. M., by President Avery. Drs. John Avery, Arthur Hazlewood, Henry B. Baker and Hon. Frank Wells, were present.

The following accounts were allowed:

Henry B. Baker, expenses attending Conference of Sanitary Officials, Chicago, Jan. 14, 1892	$20.30
H. R. Pattengill, for postage supplied to the Office of the State Board of Health	35.00

The vouchers of the members of the Board, for expenses incurred in attending the Holland Sanitary Convention, March 3 and 4, 1892, were allowed according to the certificate of the member incurring the expense.

On motion, the voucher of Theo. R. MacClure, for expenses incurred in attending the Holland Convention, was allowed, according to the certificate of the Secretary of the Board.

On motion of Dr. Baker, it was voted to ask Geo. E. Willetts to attend the next sanitary convention, providing that the next Convention should be held at Charlotte, and read his paper on "Some achievements of Sanitation, Measured by Vital Statistics," and that his expenses be allowed by the Board.

The specifications and a letter from Dr. William M. Edwards, Medical Superintendent of Michigan Asylum for Insane, relative to the "Colony Cottage under process of construction at the Michigan Asylum for Insane, Kalamazoo," were presented to the Board, by the Secretary, for consideration.

The way by which it was proposed to dispose of the excreta was questioned and discussed, and Drs. Hazlewood and Avery thought that the proposed method was all right, providing that there was plenty of muck used.

Dr. Baker thought that this Board should recommend that the foul-air flues should go out separate and distinct to the outer air; that there was no objection to grouping the flues, if they were separate and distinct; but, as the plans were not before the board, no formal action was taken.

On motion, the Board took a recess until 5:30 P. M., of the same afternoon.

SECOND SESSION, 5:30 P. M., MARCH 3, 1892.

Drs. Avery, Hazlewood, Baker, and Mr. Wells were present at this second session.

The blue-print plans for the Colony Cottage, under process of construction

at the Michigan Asylum for the Insane, at Kalamazoo, were presented to the Board by the Secretary, for consideration.

After the adoption of several motions, embodying recommendations relative to the plans, on motion of Dr. Baker the plans, with the proposed recommendations*, were approved.

On motion of Dr. Hazlewood, the Board adjourned.

REGULAR AND ANNUAL MEETING AT LANSING, APRIL 12, 1892.

The Board was called to order by the Secretary, at 10:15 A. M., and, in the absence of the President, Dr. Arthur Hazlewood was elected president *pro tem.* The members present were: Arthur Hazlewood, M. D., Grand Rapids; Victor C. Vaughan, M. D., Ann Arbor; Hon. Frank Wells, Lansing; Henry B. Baker, M. D., Lansing.

The Secretary read the minutes of the last regular meeting, held at Lansing, January 12, 1892; and, on motion of Mr. Wells, the minutes were approved as read.

Dr. Mason W. Gray came in at 10:30 A. M. and took his seat as a member of the Board.

The Secretary read the proceedings of the Special Meeting held at the City Hotel, Holland, March 3, 1892; and, in absence of any objections or corrections, the president *pro tem* pronounced the minutes approved as read.

The Secretary presented and read his report of the Examination made at the special meeting at Holland of the plans for a "Colony Cottage" under process of construction at the Michigan Asylum for the Insane, Kalamazoo, and said that if there were no additions or corrections, he would forward the report to the proper authorities.

Dr. Baker mentioned that in writing the Report he noticed the recommendation relative to the sizes of the inlet and outlets for air in the dormitory. He thought that in case the radiator for the dormitory heated the air as hot as for the sitting rooms, the register would frequently be closed to avoid too much heat, so the ventilation would be prevented, except that by windows; but the other members of the Board thought there would be no difficulty, and no change was made in the recommendation on this subject.

Secretary Baker presented a list of the vouchers allowed at the special meeting at Holland, March 3, 1892, and said that he would read them if anyone wished to hear them read.

State Board of Health vouchers numbers 2125–2128 and 2137–2156 inclusive, were allowed.

Under the head of brief announcements, the Secretary read a list of about 19 items of business which he wished to bring before the Board.

Dr. Vaughan mentioned having received from Bay City a package of coffee supposed to be poisonous; and, after having analysed it for poison, he ate a good share of it himself, and it had no deleterious effect.

The Secretary read a communication from the President relative to his not being able to attend this meeting of the Board.

Dr. Vaughan asked, "Where is the next convention to be held?"

The Secretary replied that he had been instructed to make arrangements for one at Charlotte; but those who had given the invitation had declined

*The Report on the Examination of the Plans for a proposed Colony Cottage at the Michigan Asylum for Insane, at Kalamazoo, is printed on page xvi-xvii., of this Report.

to proceed, and the health officer intimated that he could do nothing about making the arrangements; but, as Dr. Mary Green was enthusiastic for the convention, perhaps it might yet be possible to make the arrangement.

Dr. Vaughan said—"I suppose you have heard of the results of the experiments on the water supply of Iron Mountain? The company's chemist put salt in the lake, and tested for sodium in the gallery. They took two samples of water, one from the lake and one from the gallery, and the salt had not increased but had decreased slightly in the gallery. They pumped the gallery dry, and there was very little change; the slight decrease might have been accidental. There is no doubt about the water supply; it is undoubtedly an excellent supply. They have compromised in reference to pipes, and the company will put them around the lake, instead of through it."

Dr. Hazlewood—"What gave the people of Iron Mountain typhoid fever?"

Dr. Vaughan—"It was probably the supply from the wells."

Dr. Baker—"Dr. Meyer, the health officer of Iron Mountain, has been sick with typhoid fever."

Prof. Fall came in at 11:25 A. M. and took his seat as member of the Board.

Dr. Baker asked if there was any truth in the report that there was an outbreak of typhoid fever at Grand Rapids.

Dr. Hazlewood replied—"There are about one-tenth of the physicians in Grand Rapids who report typhoid fever, the other nine-tenths do not report it, but claim to see remittent fever. The question can be settled only by the bacteriologist finding the germ. I think there is no more typhoid fever than usual; but, according to the resolution of the Board, all cases of fever of doubtful origin continuing more than seven days should be reported as typhoid fever."

The Secretary presented his report of the work done in the office during the first quarter of 1892.

The Secretary presented a proposed amendment to the health laws, relative to the reports of dangerous diseases being made to the health officer only, instead of the clerk or president of the local board of health, and read a page of argument for the amendment. [Copies of the law and of the proposed amendment were handed to each member of the Board.]

The proposition was favorably received, and referred to the committee on legislation with power to act for the proposed amendment.

The subject of dangerous diseases at the State Agricultural College, the Reform School and the State School at Coldwater, was presented by the Secretary and discussed by members of the Board.

On motion, it was voted that the subject of dangerous diseases at State Institutions be referred to the committee on legislation, and that the committee be requested to formulate some plan for prompt notification to the health authorities immediately upon the occurrence of a dangerous, communicable disease in any State Institution, and for prompt action of the health authorities for the restriction of every dangerous disease in a State Institution.

The Secretary announced that the National Conference of State Boards of Health would meet in Lansing, June 6 and 7, 1892, at which meeting it was proposed to make a special study of the methods of work by the Michigan State Board of Health. He asked the following questions:

1. Will this Board adjourn this meeting of this State Board of Health to meet in Lansing June 6 and 7?

2. If not, will this Board direct that a special meeting be held at that time?

3. In the conference, each State is entitled to one vote; what member of this Board shall act as the delegate and be authorized to vote for Michigan?

4. Shall the delegate be authorized to present the leading facts relative to the work of this Board?

On motion of Dr. Vaughan, it was voted that Dr. Baker act as delegate to the National Conference of the State Boards of Health, with power to vote. That Dr. Baker present the leading facts relative to the work of the Michigan Board.

Dr. Baker said—"It seems to me that every member of this Board should be present at this Conference, and I move that a special meeting of this Board be held at Lansing, June 6 and 7." On support of Dr. Vaughan, this motion prevailed.

On motion of Dr. Gray, it was voted that Dr. Vaughan present, to the Conference of State Boards, the subject of "the Michigan Laboratory of Hygiene," and that Prof. Fall present the subject of "Sanitary Conventions."

On motion of Dr. Gray, it was voted that Mr. Wells and Dr. Baker be a committee of reception and entertainment of the Conference of State Boards, with power to act.

The Secretary presented the question whether this Board would send a delegate to the State Medical Society; also one to the American Medical Association?

On motion of Dr. Vaughan, it was voted that Dr. Baker act as delegate to the State Medical Society, and that Drs. Hazlewood and Gray act as delegates to the American Medical Association.

The Secretary presented the following preamble and resolution:

WHEREAS, Some of the dangerous communicable diseases are uncommonly prevalent in Detroit, more than one-tenth of the people of Michigan reside in Detroit, and communicable diseases tend to spread from that commercial metropolis to every part of the State, therefore,

Resolved, That a committee, consisting of the president and three other members of this Board, be appointed to visit Detroit, and confer with the health officer and with the Board of Health of Detroit, and with other city officers if found desirable, with the view of learning, and reporting to this Board, so much as is possible concerning the difficulties under which the Detroit officers are laboring for the restriction and prevention of the dangerous diseases.

Dr. Baker said—"The suggestion for a joint meeting of the two boards was first made by one of the Detroit newspapers, which intimated that it would be well for the two boards to get together and see what could be done to better the condition of Detroit. (Dr. Baker read a letter of March 19, from Samuel P. Duffield, M. D., relative to the meeting with the Detroit Board.) I think that there could be very much learned in Detroit. The law requires that every health officer make special reports to the State Board of Health when requested. The health officer of Detroit does make the weekly reports, but it is next to impossible to get any special reports from him or from the Board of Health of Detroit."

Dr. Baker said that he had written to Dr. Duffield of the Detroit board of health, for a statement of the measures taken to restrict the spread of dangerous diseases in Detroit, and results of their efforts, and, in reply,

Dr. Duffield said that Dr. Baker would find all these data in the printed material of the Detroit board. Dr. Baker had replied to Dr. Duffield that the method described in the printed report was not in accordance with the State law.

Secretary Baker read a review of the table in the last annual report of the health officer of Detroit, which the health officer considered to be evidence "of failure of sulphur disinfection." Secretary Baker recited the results of his study of the table, and concluded that it did not contain any evidence of the "failure of disinfection" as practiced in Detroit. The thirty-one instances in which diphtheria reappeared in a residence after its disinfection were accounted for by the germs of the disease remaining in the throats or on the persons or clothing of the convalescents. Of the 1,369 cases and 369 deaths, the table does not appear to include a single instance of the reappearance of diphtheria in a residence fumigated after the death of the only or last patient. The germs of diphtheria have been found in human throats two weeks after apparent recovery, and good authorities believed, from facts which cannot well be otherwise explained, that they remain much longer, so that where disinfection occurs at the time of recovery, as is the practice in Detroit, the patient, *unless longer isolated*, may continue to spread the disease. That probably explains the reappearances of diphtheria in Detroit.

The prevalence of diphtheria and scarlet fever in Detroit was discussed; comparisons were made with the rest of the State, and with New York City. The law says: "The State Board of Health shall have the general supervision of the interests of the health and life of the citizens of this State." "They shall have authority to send their Secretary, or a committee of the Board, to any part of the State, when deemed necessary to investigate the cause of any special or unusual disease or mortality."

On motion of Mr. Wells, the Board adjourned at 12:30 P. M. until 1:30 P. M., when it was suggested that the Board should continue the discussion of the subject of diphtheria and scarlet fever in Detroit.

Afternoon session at 1:53 P. M., April 12, 1892.

The members present at the afternoon session were: Drs. Gray, Vaughan, Hazlewood, Mr. Wells, Prof. Fall and Dr. Baker.

Dr. Baker thought that the State Board should not longer neglect the health interests in Detroit. Although Detroit has one-tenth of the population of the State, he thought that it is a part of the State. Dr. Duffield seems to think that Detroit is not a part of the State of Michigan; that the State laws do not govern in Detroit. If members of this Board have any doubt about Detroit being a part of Michigan, he would like to put the subject before the Attorney General, and see if the State laws do actually apply to Detroit.

On motion of Prof. Fall, the proposed preamble was changed to read as follows:

WHEREAS, More than one-tenth of the people of Michigan reside in Detroit, and communicable diseases tend to spread from that commercial metropolis to every part of the State, and

WHEREAS, Some of the dangerous communicable diseases are uncommonly prevalent in Detroit.

Dr. Baker said—"There are other questions. Dr. Duffield wishes to have a disinfecting station, and a hospital for the isolation of cases of dangerous diseases. I think this board can do much to help him get such buildings. The Board of estimates were in session, and I was in hopes that they would remain in session until after this Board had its meeting."

On motion of Dr. Gray, the committee was made to consist of President Avery, Drs. Baker, Hazlewood and Vaughan.

On motion of Dr. Baker, Dr. Gray was added to the committee.

Accordingly, the resolution was so amended that the committee was to consist of the president and four members, instead of three.

The preambles and resolution, as amended and adopted, were as follows:

WHEREAS, More than one-tenth of the people in Michigan reside in Detroit, and communicable diseases tend to spread from that commercial metropolis to every part of the State, and

WHEREAS, Some of the dangerous communicable diseases are uncommonly prevalent in Detroit,

Resolved, That a committee consisting of the president and four other members of this Board, be appointed to visit Detroit and confer with the health officer and with the board of health of Detroit, and with other city officers if found desirable, with the view of learning, and of reporting to this Board, so much as is possible concerning the difficulties under which the Detroit officers are laboring for the restriction and prevention of the dangerous diseases.

On motion of Dr. Vaughan it was voted that the Secretary be requested to make arrangements for the Conference of the Committee with the Detroit Board of Health.

The Secretary mentioned having received two fishes (bass), from Saginaw, containing parasites, with the question whether they were dangerous to the public health. The fishes were sent to Prof. Cook of the Agricultural College with the request that an examination be made, and he reported as follows: "This is the *Cysticercus* stage or encysted form of a tape worm, probably *Bothriocephalus latus*, but we could not tell from this stage. That is the broad tape worm of man, and it works in fish. Such fish should be well cooked."

The Secretary presented the subject of binding the journals in the office, and on motion of Dr. Vaughan, the expenditure was authorized.

A communication from the Secretary of the National Association of General Baggage Agents, relative to the transportation of dead bodies, was presented and read by the Secretary; also a hektographed page, "To stop transporting diphtheria corpses"; also a circular letter from the General Baggage Agent of the M. C. R. R., relative to prohibiting the transportation through certain States of bodies dead of diphtheria or heart failure.

Dr. Baker thought that prohibiting the transportation of bodies in other States prevented many bodies from going through Michigan to and from other States. The question was whether it was worth while for this Board to take further action at this time.

Dr. Vaughan—"I think that there is not much danger under the present condition."

No formal action was taken.

Dr. Baker made a verbal report, as delegate to the conference of sani-

tary officials at Chicago, January 14, 1892, and read a letter from Hon. I. M. Weston, Secretary of the State Commission, relative to the apportionment of money, and the plan for the Michigan exhibit, and notice of a meeting at Jackson, of the Board of World's Fair Managers, for the State of Michigan. Dr. Baker said that he went to see the Governor, as the Governor had charge of the Departmental exhibits, and the Governor said he was 'in favor of each Department making the exhibit out of its own appropriation, as the amount set apart for the Departmental exhibit was inadequate.' It was the expressed opinion of the Conference of Sanitary Officials that the Sanitary exhibit should be a separate one, and not in with the several State exhibits. It was decided that the Sanitary exhibit should be in the department of Liberal Arts, which is under the supervision of Hon. S. H. Peabody. It was thought that the exhibit should be made as graphic as possible, in some such way as the Michigan State Board of Health had exhibited the results of public-health work in Michigan. It was proposed to have diagrams about 18x22 inches, so that they could be plainly seen. To economize space it was proposed to have a revolving frame work on which the diagrams could be attached, and, as fast as they were seen, they could be swung around out of the way. Mr. Peabody had issued a circular stating that these diagrams should be plain enough to be seen at least fifteen feet. Dr. Baker read from the circular of Mr. Peabody relative to the plan for the exhibit.

Dr. Hazlewood—"Will the expenses of this extra work come out of our appropriation, or out of the general fund?".

The Secretary replied that it could not come out of the general fund.

Mr. Wells—"How long will it take to make preparation for this exhibit?"

The Secretary replied—"I think, if a good man should start now, that he would not more than finish in time. The lettering should be large and plain so that it will catch the eye quickly."

Dr. Vaughan moved that the Secretary of this Board be requested and expected to prepare an exhibit worthy of the State Board of Health, which will show its work, and, so far as practicable, the results.

On support of Prof. Fall the motion prevailed.

The Secretary mentioned having collected from recent publications, tables, statements and other literature bearing upon the duration of infectiousness of dangerous diseases, especially diphtheria. He had the material hektographed for convenience of study by members of this Board and others. He moved that the material be referred to Prof. Vaughan, and that he be asked to continue the study of the subject in connection with the pamphlet on diphtheria, with a view to its greater perfection, and to report to the Board at some future time.

Dr. Baker said: "There has been recently a discussion in Berlin about the diagnosis of diphtheria. Some of the bacteriologists claimed to cultivate the diphtheria bacillus, and tell certainly whether the case in question was diphtheria, inside of forty-eight hours." He asked Dr. Vaughan if there was any unanimity of opinion on the subject. Dr. Vaughan said he did not think there was; and thought that it would be very difficult for the average physician to make cultivation of germs and be ready to make a certain diagnosis of diphtheria.

Mr. Wells spoke of the Barnum case of diphtheria at the State Agricultural College, and how the disease was spread at the party where Mr.

Barnum was in attendance, and that those who contracted the disease of Mr. Barnum also spread diphtheria to others.

Dr. Baker's motion relative to Dr. Vaughan continuing the work on the subject of diphtheria, and the duration of infectiousness of dangerous diseases, was renewed and adopted.

Dr. Baker presented an account of an explosion of a lamp, at Ludington, Michigan, containing a new brand of oil advertised by the Standard Oil Co. as "Eocene." A sample of the oil was tested at the office of the State Board of Health, and was found to flash at 110° F. and burn at 115° F. The Secretary also presented, in this connection, a letter from health officer F. W. Graham relative to this explosion.

The Secretary presented the question whether there was arsenic in kerosene oil. He presented a newspaper which claimed that oil which comes from the Ohio wells contains sulphur, arsenic, and other noxious constituents which refining does not remove.

Prof. Fall spoke of a dealer in Albion who was selling three different priced oils. The oils sold for 13, 14 and 16 cents. He had obtained and tested the three samples, and found that the 16 cent oil was that which came from the Standard Oil Co. and was the poorest one of the lot.

Mr. Wells said that there was arsenic in Ohio oils; and sulphur in the Pennsylvania oils; and that the Standard Oil Co. sold their Ohio oils in the west mostly.

Dr. Baker thought that it was very important to the citizens of Michigan whether there was arsenic in kerosene oil, and thought that this Board would do well to find out what they could on the subject. In view of the fact that all such poisons in oil burned go into the air to be breathed, that such oil is used in many places throughout the world and that influenza has been unusually prevalent, any probable cause of irritation of the throat and air-passages, such as arsenic is known to be, should be investigated. Dr. Baker moved that, if found practicable, Dr. Vaughan be requested to find, quantitatively, how much arsenic there is in the oil used in Michigan. The motion prevailed.

Mr. Wells described the process of refining oils, and told in what ways the different products were utilized. He thought that the Standard Oil Co. was sending into Michigan better oil than they did soon after the new law went into effect.

Dr. Hazlewood left at 3:25 P. M.

Dr. Gray presented the question whether it would be practicable to have printed matter at the World's Fair for distribution.

Dr. Baker said that there was a rule in regard to printed matter being distributed at the Fair; he could not then repeat it, but thought there would be no objection to having a pile of pamphlets or leaflets, so that people who felt inclined could help themselves.

The Secretary presented an invitation, from Dr. Tyson Smith, for a sanitary convention to be held in Newaygo, in the near future; but he thought it would be impossible for the Board to get ready for a convention so soon. No formal action was taken.

Dr. Baker then read his quarterly report of work in the office during the first quarter of 1892, the report having been presented but not read early in this meeting.

[The Secretary's Quarterly Report will be found printed on subsequent pages of this Report.]

The Board adjourned at 4:03 P. M.

SPECIAL MEETING, LANSING, JUNE 6, 1892.

The meeting was called to order by President John Avery. Arthur Hazlewood, M. D., Grand Rapids; John Avery, M. D., Greenville; Prof. Delos Fall, M. S., Albion; Hon. Frank Wells, Lansing, and Henry B. Baker, Lansing, were present.

State Board of Health vouchers numbers 2164 to 2177, inclusive, were allowed, subject to the certificate of the member and signatures of the President and Secretary.

On motion of Dr. Baker, Drs. Avery and Hazlewood were appointed a committee from the State Board of Health to visit the township of Oakfield, Kent county, to confer with citizens with reference to an alleged nuisance.

AMERICAN MEDICAL ASSOCIATION MEETING, DETROIT, JUNE, 1892.

REPORT OF THE DELEGATE APPOINTED TO REPRESENT THE STATE BOARD OF HEALTH.

MR. CHAIRMAN, AND MEMBERS OF THE MICHIGAN STATE BOARD OF HEALTH:—The forty-third annual meeting of the American Medical Association was held in Detroit, June 7th to 10th inclusive. It was pronounced by some of the oldest members present to have been the most successful meeting ever held. Having the honor of attending as a delegate from this Board, I, naturally, was most interested in matters pertaining to preventive medicine and gave my attention mainly to addresses and discussions on that subject. I was everywhere strongly impressed with the prominence given to sanitary science. Not only is there an entire section of the association devoted to this branch of medicine, but in the other sections consideration of various subjects pertaining to it frequently formed part of the program.

The section on State medicine was well attended during every session, and many of the prominent physicians of the country participated daily in its work.

The chairman of the section, Dr. Benj. Lee, set forth in his annual address his views on the responsibility of the general and State governments in the matter of protecting the purity of our water supplies. To my mind, the most important subject presented in this section was that treated of by Dr. A. N. Bell in a paper entitled "Needful National Legislation in the Protection of Human Life." The papers treated chiefly of the transmission of epidemic diseases by commerce. Dr. Bell showed how unsatisfactory and inefficient are the preventive methods which now obtain, a fact which has been painfully apparent to this Board, and argued strongly in favor of a national health service and, what would naturally follow, efficient international regulations. The papers presented before the section were all of a high grade and such interest was manifested in them, that more time was consumed at each session than was allotted for the program.

In the Section of Diseases of Children the morning of the third day was devoted to the consideration of the nature of scarlet fever and the best methods for its restriction and prevention.

Dr. Hazlewood and Dr. Vaughan were the chief participants in this

discussion. These gentlemen presented their well known views in interesting and forcible addresses. In connection with this discussion, Dr. Brush of New York presented a paper on the "Contagium of Scarlet Fever." The doctor gave the facts in a case occurring in his own experience, which made it evident that the contagium had remained active in clothing stored in an attic chest for thirty-five years.

In the general sessions the cause of preventive medicine was made prominent. The address on State medicine by the well known sanitarian, Dr. J. Berrien Lindsley, entitled "The People and the Public Health Movement," was a review of the growth of sanitary work in this country and was well received. While physicians are, naturally, by their profession and education prominent and often foremost in public health work, yet the progress which has been made and is being made is not due to the efforts of the medical or any one profession, but to the mutual efforts of the intelligent people of this country; and owing to the work of these, sanitary knowledge has become disseminated to such an extent that the public are in advance of the state legislatures and of congress, and are beginning to ask for much needed legislation, and national support and protection.

In his address on general medicine Dr. Gihon, Medical Director of the U. S. Navy, cited recent experiments which prove that the blood of animals having artificial immunity to anthrax and diphtheria injected into susceptible animals protects them against these diseases; and further that four cases of tetanus, one of them far advanced, have been successfully treated by injections of tetanus antitoxines obtained from an animal that had been rendered immune to tetanus. Dr. Gihon cited other experiments which strongly suggest that acquired immunity from any of the infectious diseases is due to the formation of antitoxines in the blood of the immune animal, and quoting Sternberg says: "The inference is justifiable that the blood and tissue juices of an individual who has recently suffered an attack of small-pox or scarlet fever contain an antitoxine that would neutralize the active poison in the circulation of another person immediately after infection, and holds the experiment warrantable to ascertain whether a small quantity of blood drawn from the veins of a protected person would suffice to arrest or modify the course of these diseases. The transfusion of a moderate amount of such blood might be curative, or confer immunity in advance of infection." In commenting on the future foreshadowed by these experiments, Dr. Gihon says: "Certainly when prevention and cure shall thus go hand in hand, the high estate of preventive medicine shall never more be questioned."

This brief report may serve to show the prominent part which sanitary problems take in the thought and daily work of the representative physicians of the country.

Very respectfully submitted,

M. W. GRAY.

REPORT OF COMMITTEE OF THE STATE BOARD OF HEALTH, ON THE WORK CARRIED ON IN THE OFFICE OF THE SECRETARY OF THE BOARD.*

At the July 14, 1891, meeting a special committee, consisting of Hon. Frank Wells, Hon. John Avery, M. D., president, and Henry B. Baker, Secretary of the Board, was appointed to make a thorough investigation, and report to the Board the details of the several lines of work carried on by the office of the State Board of Health. Members of the committee devoted considerable time to the work. The Report is now submitted:

Section two of the act establishing this Board provides as follows:

"SEC. 2. The State Board of Health shall have the general supervision of the interests of the health and life of the citizens of this State. They shall especially study the vital statistics of this State, and endeavor to make intelligent and profitable use of the collected records of deaths and of sickness among the people; they shall make sanitary investigations and inquiries respecting the causes of disease, and especially of epidemics; the causes of mortality, and the effects of localities, employments, conditions, ingesta, habits, and circumstances on the health of the people. They shall, when required, or when they deem it best, advise officers of the government, or other State boards, in regard to the location, drainage, water supply, disposal of excreta, heating and ventilation of any public institution or building. They shall from time to time recommend standard works on the subject of hygiene for the use of the schools of the State."

In pursuance of a resolution passed at the last regular meeting of this Board, July 14, your committee have endeavored to investigate the work of the Office of the Board, and to learn from such investigation to what extent this Board is carrying out the provisions in section two of the Act establishing the Board. The investigation led us first to consider the weekly reports of diseases. These card reports we find are received from about one hundred regular observers, located in different parts of the State, who report weekly upon postal cards containing a list of the most common diseases; and, every Wednesday, a bulletin is issued containing the information obtained from these cards, showing the diseases which caused the most sickness in the State during the preceding calendar week. The bulletin also gives information collected from all other sources, showing every place in the State where a dangerous communicable disease is present and is reported as the law requires. It shows the extent to which these contagious diseases prevail around the State, so far as information reaches this Office, and the relative importance of all the common diseases which have caused sickness in Michigan during that week. Copies of this bulletin are sent to each member of this Board, and to such newspapers as express a willingness to utilize them; also to other persons in Michigan, who in the judgment of the Secretary, may be benefited by them. They are printed by the hektograph process, and about fifty are distributed.

At the close of each month, a monthly bulletin giving similar information is issued, based on the same sources of information. About eighty copies of this are issued and sent to sanitary journals and other exchanges of the Office.

At the close of each quarter, there is a summary of the conditions of the health during the last quarter, prepared from the same sources of information, making a comparison with the preceding quarter and with the corresponding quarter in previous years. This quarterly summary is

* The report of this committee was made at the meeting of the Board, Jan. 12, 1892.

presented to the Board at its regular meetings, and sometimes is published, in the printed proceedings of the meeting, to the number of about 1,200 copies.

The main use of the weekly card reports of sickness is to supply the sickness statistics for the Annual Report of this Board, which form a permanent history of the sickness in Michigan, and must forever be of great value to all statistical scientific investigations into the causation of diseases, and their prevention. In this work, one man is constantly employed, and, another man about one-half of the time. This work is greatly in arrears, partly due to the fact that men formerly engaged on this work have left this office because of better salary, and the work has been assigned to other clerks.

METEOROLOGY.

In pursuance of knowledge of causes of diseases, meteorological observations have been held by the Board to occupy no unimportant place. These observations are made three times a day, and reported monthly, by a corps of observers in different parts of this State. These observations include the temperature and humidity of the atmosphere, atmospheric pressure, clouds, wind, ozone, rain, snow, fogs, and thunder storms. The records of these conditions are compiled for each station for each month; tables and diagrams are made exhibiting the facts, and comparisons are made with corresponding months in other years, and all these are studied in connection with tables and diagrams exhibiting the facts concerning each of the prominent diseases. Such facts, tables and diagrams are published in the Annual Report. Some of the material is also utilized in the weekly, monthly, and quarterly bulletins showing the conditions of health and the coincident atmospheric conditions in Michigan. The time of one man and about half the time of another man is constantly employed on this work.

SOURCES OF INFORMATION OF THE OCCURRENCE OF THE DANGEROUS COMMUNICABLE DISEASES.

The law provides that all cases of dangerous communicable diseases shall be reported to the local health authorities; and, by them, the information is required to be promptly transmitted to the office of the State Board of Health. The State Board of Health supplies the blanks for such reports by the local officers. Reports on these blanks are received from different parts of the State every day; but, up to the present time the local officers do not supply the knowledge of every case; because these cases are not all reported to them by the householders and physicians. The State Board of Health supplies local health officers with three forms of blanks: one for the outbreak report, one for the weekly report during the outbreak, and one for the final report at the end of the outbreak, showing how many cases, how many deaths, and just what was done to restrict the spread of the disease.

Another source of information of the existence of a dangerous communicable disease is through the local columns of the newspapers. Papers from all over this State are looked through for cases of dangerous communicable diseases not reported as the law provides. Such instances are immediately acted upon, the local health officer is notified, printed direc-

tions for the restriction of the disease are sent to him, he is asked to distribute copies of them to the neighbors of the persons sick, and he is urged to take prompt action for the restriction and prevention of the disease. However the information comes to this office, a record is immediately made, the account with each of the dangerous diseases being kept in a book by itself, to make it possible at the end of the year to compile the facts concerning each of these diseases.

In the work connected with the collection and collation of this information, the time of one man is taken. In the compilation of the facts relative to all the dangerous diseases the time of another man is employed. But it is doubtful if one man can do all the work.

DISTRIBUTION OF DOCUMENTS.

The varied literature created by the Board is distributed in many ways, and for many purposes, and its distribution occupies fully the time of one man, and about one half the time of another man. The most important of this distribution is the sending of pamphlets and leaflets, telling how to restrict the disease, to the various localities where a dangerous communicable disease is present. These pamphlets are sent to the health officer, and sometimes to the president and clerk of the local board of health, for distribution to the neighbors of the family in which the sickness is, to the local papers, physicians, ministers, teachers, and others likely to aid in the restriction. From 5,000 to 10,000 pamphlets relating to each of the six or seven most dangerous communicable diseases are thus distributed by this Board annually.

General distributions of the regular publications of the Board are made to the 1,500 local health officers in the State, some of the publications to the president and clerk of the local boards of health, to the physicians who correspond with the Board, and those who contribute weekly reports of sickness to the meteorological observers, to the exchanges of the Board including sanitary journals, health officers in other states, secretaries of State Medical Societies, officers of other State Boards of Health, and to the boards of health in other countries who send their publications to this Board. From time to time publications are sent to newspapers in Michigan, to those who have taken part in sanitary conventions, and to the many who apply for publications on special topics, such as sewerage and drainage, ventilation, school hygiene, abatement of nuisances, transportation of dead bodies, diseases of children, public health laws, etc.

THE USE OF THE LIBRARY OF THE BOARD.

One branch of office work done for the purpose of aiding those in Michigan who are contributing to the public-health work in this State, is the marking and card-cataloging of the recent valuable contributions to sanitary literature, the classification of this literature in the library of this Board, selecting from it by means of the card catalog and sending to the members of the Board, and to all others who take part in the sanitary conventions in Michigan, all the late and most important contributions on the subjects to be discussed at such conventions.

SANITARY CONVENTIONS.

This work of the Board through the sanitary conventions, begun about ten years ago, is yearly becoming more important. Three or four of these

sanitary conventions have usually been held every year during this period, and have created much interest in the work of the Board, and have been productive of much benefit in supplying sanitary knowledge in the different localities where these conventions have been held.

There are more applications for sanitary conventions than the Board have means at their command to hold; and the Board is, therefore, compelled to select such places as in its judgment would be most benefited. When such selections have been made the Board sends a committee, to the locality decided upon, to make the necessary preliminary arrangements, such as the selection of speakers and topics, securing notices in local papers, and in other ways seeking to secure an interest which shall make the convention successful. This office then sends out printed announcements of the time, place, and topics; and, later, prepares, prints and sends programs to any one likely to attend, including the health officers of cities and villages. These preparations involve a large amount of time and labor in the office. After the convention is over the office collects the papers and discussions, and arranges, edits and publishes them in pamphlet form. The reading of the proof, the correspondence with the authors relative to the proof, and the making of reprints takes more or less time. The committee estimates that the office work for promoting and carrying forward these conventions, which we have described, takes the time of one man.

CORRESPONDENCE.

The general correspondence of the office is large, and is increasing. It consists chiefly in answering the questions of officers and members of local boards of health, relating to laws governing certain cases, and questions of sanitary policy; also answering inquiries and complaints of others besides members of local boards, relative to alleged nuisances, relative to the alleged failure of performance of the duties by local officers; also answers to questions asked by persons interested in the establishment of general water-supplies, sewerage, and drainage systems, school hygiene, etc.

The general and special correspondence of the office is mostly copied in the letter book by a letter press, and amounts to about 4,000 letters per year.

BOOKS OF RECORDS.

It has been found necessary to keep a large number of books of records:—

1. The record of the proceedings of the regular and special meetings of the Board.
2. A classified expense account book, in which is entered the amount and nature of every voucher since the organization of the Board.
3. An order book, to facilitate the auditing of bills and accounts, in which is entered all orders for supplies of the Board, contract price noted, and whether or not the account has been allowed.
4. A distribution book, in which is the name and address of each person to whom is sent the Annual Reports, Supplements, pamphlets, and other publications of the Board.

5. Time book, for clerks.

6. Issue book, for record of issues of stationery, blanks, circulars, etc., to health officers, clerks, supervisors, and meteorological observers for making monthly and yearly reports to this office.

7. Library accession book.

8. Library loan book.

9. Property accession book.

10. Property loan book.

11. Record of periodicals received.

12. Postage book, a record of the postal fund, expenses for telegrams, express, etc.

13. Stamp book, classifying the uses of postage stamps, as, for Annual Reports, etc.

14. Manuscript book, for keeping a record for all manuscript sent to the State Printer.

16. Record of weekly reports of sickness from health officers of cities and special correspondents.

17. Record of correspondence, and reports to the State Board of Health, relative to diphtheria.

18. Record of correspondence, and reports to the State Board of Health, relative to scarlet fever.

19. Record of correspondence, and reports to the State Board of Health, relative to typhoid fever.

20. Record of correspondence, and reports to the State Board of Health, relative to measles.

21. Memorandum book, of letters in the office letter-books replying to questions which require special knowledge of laws, or decisions on sanitary subjects.

The number of clerks employed on each class of work, and the annual expense for each of the classes of work in the office of the State Board of Health is, approximately as follows:—

Classes of work.	Men employed.	Cost.
Correspondence (general)	1	$1,000
Correspondence on dangerous diseases	1	1,000
Receiving, recording and filing reports	½	500
Compiling data relative to dangerous diseases	1	1,000
Weekly reports and statistics of sickness	1½	1,500
Meteorological work and statistics	1½	1,500
The receiving and distribution of publications and report blanks	1½	1,500
Sanitary conventions	1	1,000
Miscellaneous work, work in connection with dangerous diseases, messenger and janitor work	1	600
Total	10	$9,600

EXPENSES FOR PRINTING AND BINDING THE ANNUAL REPORT AND SUPPLEMENTS FOR 1889.

For printing and binding the Seventeenth Annual Report of the Michigan State Board of Health, 1889—$1,733.54.

For printing and binding the Supplement to the Annual Report, 1889, of the State Board of Health—Public Health Laws, in force in 1890 (5,993 copies) $549.91.

FOR PRINTING THE SUPPLEMENTS FOR THE FOUR SANITARY CONVENTIONS HELD IN 1890.

Cost on account of the Lapeer Convention.

Printing announcements and ruling note	$4.03
Printing programs	6.23
Composition and presswork of proceedings	59.10
Corrections on the same	1.80
Covers for the proceedings	4.80
Folding, stitching and covering proceedings	6.00
Postage to the Secretary of the Convention	5.00
Reprint No. 333 (making over form, presswork, binding)	1.70
" " 334 " " " " "	1.80
" " 335 " " " " "	3.60
" " 336 " " " " "	1.35
Covers to reprint No. 334	.30
Printing envelopes for the use of the Secretary of the Convention	.45
A. A. Clark (expenses and compensation)	47.51
John Avery, M. D. (expenses)	12.31
H. F. Lyster, M. D. (expenses)	5.50
Prof. Delos Fall (expenses)	14.45
H. B. Baker, M. D. (expenses in making arrangements)	5.01
H. B. Baker, M. D. (expenses attending convention)	7.96
Postage for announcements sent out	6.55
Postage for programs sent out	6.16
Envelopes used in sending out announcements and programs	2.03
	$203.64

Cost on account of the Alpena Convention.

Printing announcements, ruling note	$2.93
Printing programs	5.75
Printing envelopes for the Secretary of the Convention	.45
Composition and presswork on the proceedings	63.91
Correction on the proof of the proceedings	4.80
Covers for the proceedings	4.80
Folding, stitching, binding proceedings	6.00
Reprint No. 343 (making over form, presswork, binding)	1.90
" " 344 " " " " "	1.50
" " 345 " " " " "	1.50
" " 346 " " " " "	1.70
Postage for use of Secretary of Convention	5.00
A. A. Clark (expenses and compensation)	61.75

H. F. Lyster (expenses)	$25.00
Prof. Delos Fall (expenses)	25.50
H. B. Baker, M. D. (expenses in making arrangements)	17.22
H. B. Baker, M. D. (expenses attending Convention)	21.50
Postage for announcements sent out	6.30
Postage for programs sent out	6.40
Envelopes used in sending out programs and announcements	2.03
	$265.94

Cost on account of the Battle Creek Convention.

Printing announcements, ruling note	$2.68
Printing programs	6.95
Printing envelopes for use of Secretary of Convention	.45
Composition and press work of proceedings	45.08
Covers to proceedings	4.80
Folding and stitching, covering proceedings	6.00
Reprint No. 337 (making over form, press work, binding)	1.55
" " 339 " " " " " " "	1.55
" " 340 " " " " " " "	1.70
" " 341 " " " " " " "	1.70
Postage for use of Secretary of Convention	5.00
A. A. Clark (expenses and compensation)	46.95
John Avery, M. D., (expenses)	11.00
H. F. Lyster, M. D., (expenses)	12.40
Prof. Delos Fall (expenses)	3.50
H. B. Baker, M. D., (expenses attending Convention)	8.72
Postage on programs sent out	6.25
Postage on announcements sent out	5.20
Envelopes used in sending out programs and announcements	1.83
	$173.31

Cost on account of the Charlevoix Convention.

Printing announcements, ruling note	$2.98
Printing programs	6.25
Printing envelopes for use of Secretary of Convention	.45
Composition and press work of proceedings	36.31
Covers for the proceedings	4.80
Folding, stitching, covering proceedings	6.20
Reprint No. 349 (making over form, press work, binding)	1.70
" " 350 " " " " " " "	1.35
Postage for use of Secretary of Convention	5.00
John Avery, M. D., (expenses)	20.50
Arthur Hazlewood, M. D., (expenses)	23.90
J. H. Kellogg, M. D., (expenses)	17.95
V. C. Vaughan, M. D., (expenses)	24.60
H. B. Baker, M. D., (expenses making arrangements)	17.23
H. B. Baker, M. D., (expenses attending Convention)	20.05
Postage on programs sent out	7.00
Postage on anncuncements sent out	6.75
Envelopes in sending out announcements and programs	2.20
	$205.22

EXPENDITURES BY THE STATE BOARD OF HEALTH IN THE CALENDAR YEAR, 1890.

Engraving, drawing, etc.		$1.70
Expenses of members	Attending meetings	47.50
	" Sanitary Conventions *	313.66
	Other official	383.01
Instruments and books		278.18
Paper, stationery, etc.		372.31
Postage		904.00
Printing and binding		780.12
Secretary		2,500.00
Sanitary Conventions *		168.21
Express		54.32
Telephones and telegrams		60.87
Miscellaneous		135.98
Total		$5,999.86

RESULTS OF PUBLIC HEALTH WORK IN THE PAST, AND NEED FOR MORE SUCH PUBLIC HEALTH WORK IN MICHIGAN.

Bearing upon the question of whether more or fewer clerks should be employed, there are several lines of evidence, somewhat indirect, but useful to be considered. Detroit is a city of about 200,000 inhabitants; the expenditures by its board of health are about $10,000 per year; and, compared with other large cities, are believed to be very small. The State of Michigan contains about 2,000,000 inhabitants. If the expenditures of the State Board of Health bore the same ratio to the inhabitants that the expenditures of the Detroit board of health do, they would equal $100,000. The fact is that the expenditures by the State Board of Health do not equal one-fifth of that amount. One or two more clerks than are now employed by the State Board of Health, might be employed and still keep within the one-fifth of the Detroit ratio, that is to say, not exceeding $20,000 per year. So far as relates to Detroit, it is not claimed that the (comparatively indirect) influence of the State Board of Health is worth more than about one-fifth of the (more direct) influence of the Detroit board, but taking the State as a whole, and especially in the rural districts, the influence of the State Board of Health must approach the ratio of the usefulness of the Detroit board; and, if so, its expenditures might well be expected to approach the ratio of the expenditures in Detroit, which for the entire State would be about $100,000 per year.

There is good statistical evidence that at least eleven hundred lives per year are being saved in Michigan from three diseases alone, through influences and measures—chiefly by isolation and disinfection—inaugurated and recom-

* This is only a portion of the expenses for Sanitary Conventions. Nearly every item in this list includes expenses properly chargeable to Sanitary Conventions; including the two items above marked *, but not including all the items, the expenditures on account of the four Sanitary Conventions held during the year 1890, for printing announcements and programs, postage and stationery used by the Secretaries of the Conventions, expenses of members in attending the Conventions, postage and envelopes for sending out programs and announcements, and printing the proceedings of the Conventions, were as follows:—

Lapeer, March 27 and 28, 1890	$203 64
Battle Creek, June 25 and 26, 1890	173 31
Alpena, July 10 and 11, 1890	265 94
Charlevoix, August 14 and 15, 1890	205 22
Total for the four Conventions	$848 11

mended by the State Board of Health. If these persons whose lives are being saved, be estimated as worth, for what they will earn above the cost of their maintenance, say five hundred dollars each (statisticians estimate each adult worth about a thousand dollars), then there is being saved in Michigan eleven hundred times five hundred, or ($550,000) more than half a million dollars per year. This does not yet contain an argument for greater expenditures in the same direction; although it does prove that what has been expended in State health work, has been indirectly returned to the people many times over, so that there has been no money lost, or permanently expended, but, besides the saving of human life, health and prosperity, there has resulted to the people an immense money gain.

But there is a different view of this subject which, in the opinion of this committee, supplies a powerful plea for greater effort, on the part of the State, in the same directions which have been proved to be so profitable to the people. This view contemplates, not what has been, but what has not been accomplished. There still prematurely die in Michigan in every year, thousands of our people whose lives should be prolonged throughout the productive period, thousands die from diseases known to be preventable, from diseases which the State Board of Health has published plain directions how to restrict and prevent. The vast import of these facts can hardly be realized,—not only are the five diseases which cause the most deaths in Michigan already known to be preventable, but this State Board of Health is teaching the people how to prevent four out of the five, and its work on the remaining one should not be longer delayed by any lack of clerical help which is authorized by law. To thus delay would be stopping to count the cost while fellow beings are dying all around us for lack of effort which we have the power to make but will not because it involves the expenditure of a little money, and money, too, which there is good reason to believe would be returned many times four-fold. If the $15,000 per year expended by the State Board of Health in the past has led, as we believe it has, to a saving of eleven hundred lives, worth half a million dollars, per year, we have reason to hope that by the expenditure, in the same directions, of thirty thousand dollars per year there may be the saving of the full million of dollars per year, and a saving of twenty-two hundred lives, and all that that implies. Even then there would still remain four or five thousand deaths per year from the seven dangerous communicable diseases which the State Board of Health already knows how to prevent or restrict, saying nothing of those diseases on which its investigations are promising. But, if the State Board of Health does what seems to be its duty, in using, judiciously, the means which past legislatures have thought best to entrust it with, is there not reason to hope that coming representatives of the people may entrust it with larger means of usefulness,—means adequate to even more effectually cope with the most dangerous communicable diseases, those greatest causes of deaths, of sickness, of pauperism, and of money losses among the people.

The methods by which knowledge of the outbreaks of contagious diseases is obtained by the Board is probably as perfect as the law and public opinion will admit. The prompt and energetic action of Secretary Baker and the employés of the office when information of such outbreaks are received by them seems to be thorough, intelligent and effective. Not only is everything done to restrict the spread of the disease, but very accurate histories of every outbreak are secured which are of great value.

Lastly the meteorological record in the weekly bulletin which also goes to make up a portion of the permanent records of the office possesses undoubtedly a value of its own. But it is for the purpose of studying the relationship which exists between the conditions shown by this record and disease that it is sustained by the Board.

The really important information contained in the Bulletin,—that relating to epidemic or contagious diseases is given to the press, and made use of by it to a limited extent. That this great power of the press should be so little used to bring to the people of the State the valuable knowledge in the records of the Board seems to your committee a great misfortune. While Sanitary Conventions are doing much to popularize this knowledge there yet remains unused the messenger which carries tidings to every home in the land, the newspaper. Your committee believe that, at the present time, money could be expended to better advantage in the preparation of brief, interesting and valuable information selected from the archives of the Board, its correspondence and reports, put into attractive readable form by competent hands, and furnished to the press than in any other way. This need require but a portion of the time of one man, for members of the Board would unquestionably aid in this work. We believe such literature showing to the people what the Board has done and is continuing to do to prevent disease and death would react most favorably upon it and give to the Michigan State Board of Health a popularity it had never before enjoyed. In addition to this, justice and humanity demand that the knowledge paid for by the people should be placed before them in a manner most available for their benefit. Finally we are glad to note the general efficiency of the clerical force of the office and the conscientious efforts made by them in the performance of their duties. Your committee has endeavored earnestly and honestly to put you in possession of all the facts concerning the conduct, system and methods of the office, leaving it for you to decide whether changes in any of these shall or shall not be made.

FRANK WELLS,
JOHN AVERY,
HENRY B. BAKER,
Committee.

The foregoing report was adopted by the State Board of Health at its regular meeting, January 12, 1892.

THE WATER SUPPLY OF NEGAUNEE.

RECOMMENDATIONS BY THE STATE BOARD OF HEALTH.

Read by Dr. Avery, President of the Board, in connection with his remarks to the Sanitary Convention, Negaunee, Mich., August 14, 1891:

In the judgment of the State Board of Health, it seems desirable that a source of water-supply, less liable to contamination than Teal Lake, should be found; but, if it should prove impracticable to obtain water from a better source, and water must still be taken from the lake, we would respectfully recommend:—

1. That all slaughter houses, and similar establishments, be removed to a point where the drainage will be away from the lake.
2. That the lake be no longer used for the storage of saw-logs, or for the deposit of refuse from mills.
3. That an intercepting sewer be constructed along the south and east shores of the lake, and all residences on that water-shed be connected therewith.
4. That, if found practicable, all water from the mines shall be disposed of through this intercepting sewer; if this is not practicable, that it be disposed of by other means than by being pumped into the lake.
5. That no rubbish, refuse, or filth of any kind be allowed to be deposited any where upon the shores of the lake.

THE PROPOSED WATER SUPPLY OF HANCOCK.

REPORT OF COMMITTEE OF STATE BOARD OF HEALTH.

Dr. J. E. Scallon, President of the Village of Hancock:

DEAR SIR:—The undersigned, a committee from the State Board of Health, in accordance with an invitation received from you, respectfully report that they have visited several sites suggested for a future water-supply for your village, have carefully examined them, and, on the basis of that examination, respectfully make the following recommendations:—

1. Owing to the fact that Portage lake is constituted by nature to be the natural catch-basin for all the drainage for both Hancock and Houghton, it would be unwise in the extreme to use the water from the same. The mineral matters might be filtered out, the organic matters might be precipitated, but disease germs cannot with certainty be removed from or kept out of this water.
2. The proposed location of wells along the bank of the lake is objectionable, from two standpoints:—
(*a*) It is likely that the water thus obtained would largely be lake water filtered through a comparatively few feet of earth.
(*b*) The wells would also receive the drainage of the land above them, which land is now and has been for a few years past the common dumping ground for refuse from the village.
3. If no better location can be found, the committee suggest that wells be sunk at points back from the lake, at the immediate base of the high hills running parallel with the shore of the lake.
4. Much better than this would be the water obtained still higher up the bluff, in the vicinity of the source of the present water-supply. From its higher altitude, this water would be subject to less contamination, and it would also possess an advantage from the fact that water could be delivered to the village by gravity. There seem to be wells of water at the extreme tops of some of these hills, but whether these would yield a sufficient supply could be ascertained by experiment.

Whichever location is adopted (unless it be Lake Superior) the water-shed (from the rainfall upon which the water is to be derived) would need to be carefully protected and constantly guarded from contamination.

Very respectfully,

Lansing, Mich., Aug. 20, 1891.

HENRY B. BAKER,
FRANK WELLS,
DELOS FALL,
Committee.

PAST, PRESENT, AND PROPOSED SANITARY CONDITIONS IN IRON MOUNTAIN, MICH.

REPORT TO THE CITY COUNCIL, BY THE STATE BOARD OF HEALTH.

TO THE HONORABLE MAYOR AND COUNCIL OF THE CITY OF IRON MOUNTAIN, GENTLEMEN:—In accordance with your request that we, members of the Michigan State Board of Health, place before you, in brief form, any recommendations which we may desire to make concerning the sanitation of your city, the following is respectfully submitted:

In the first place, it may be well to formulate some of the facts concerning the sanitary condition of your city, as it has existed for the past few years, and as we found it at the time of our inspection:

In 1887 you suffered from a severe epidemic of typhoid fever. At that time the sickness was attributed to the polluted well water which many of your inhabitants drank. Analyses made by chemists of your city, and those made at the State laboratory of hygiene alike condemned this water. In our report of four years ago there occurs the following paragraph: "There can be no question about the need of a supply of pure water. This should, by all means, be obtained; and some provision should be made for disposing of excrement, slops and garbage. It matters not how cold it may be this winter, the low temperature will not destroy the typhoid germ unless there be successions of freezing and thawing; and with the soil filled with these germs some of them will be likely to find their way into the air breathed, food eaten, or water drank, and produce the disease. It should also be remembered that typhoid fever may be caused by the use of impure ice."

We see no reason now for changing the opinion expressed at that time, both by those of your city who examined into the matter and ourselves, that the water taken from the surface wells so largely employed by your people formed the chief source of the disease. While some sanitary advance has been made since that time, as is shown by the partial filling of a stagnant pool near the center of your city, the general sanitary conditions remain the same as they were four years ago, and, consequently, the same disease prevails. Many of your people continue to deposit excrement and other waste in privy vaults and cesspools, and to take their drinking water from the same stratum, or a lower stratum, of earth. We see no probability of the permanent disappearance of typhoid fever so long as the above-mentioned method of disposing of waste, and the source of drinking water continue the same.

We are glad to see that you are introducing a system of sewerage; and we wish to express the hope that you will rapidly extend the lines until every house is connected with the sewers. You should also give more attention to the disposal of garbage. This should not be allowed to accumulate and decay in alleys and back-yards. While typhoid fever is largely disseminated by polluted water, there can be no doubt, in our opinion, that it may originate by contaminations of the air and soil.

As to your water-supply, we have the following statement to make: First, in regard to the desirability of obtaining your water from near Quinnesec falls, we would ask you to remember that the outflow of these springs lies many feet below the outflow of your sewerage as you propose

to dispose of it, and while the water from the springs at the falls may be and probably is, at the present time, altogether unobjectionable, the danger in its possible pollution in the future should not be disregarded.

In reference to the water which the Iron Mountain Water Co. has been furnishing, and also concerning that which it purposes to furnish, we think that the following statements may be made:—

(1.) The location of the well in the low, marshy ground between the city and Lake Antoine was unwise. Indeed it has been shown to be unwise for two reasons, viz.: The supply has been inadequate, and the quality has been unsatisfactory. We believe that the water company management will not deny these statements.

(2.) Taking the supply from the lower extremity of Lake Antoine where the water is only a few feet deep, and the bottom of the lake filled with mud and decomposing vegetable matter, has also, as might have been expected, proved unsatisfactory. In regard to this water, there seems to be no reason for changing the verdict of our chemist as given some months ago. The water is chemically bad, but contains no pathogenic germs. The testimony of your physicians and others, during our visit, was that this water was repulsive to the taste and smell, but that there was no proof that it had caused any disease; in fact nearly all claimed that those who had used this water had escaped the fever. However, we do not hesitate to say that this is not a suitable water.

(3.) Whether the water which will flow into the galleries now being constructed will prove ample in amount, and wholesome in quality, we have no means of positively determining at present. Provided that it is shown that this water comes from the hills to the north, and that it is abundant, we can see no *a priori* reason for condemning it. Thorough chemical and bacteriological analyses of it should be made from time to time, and, by this means, we believe that the question of its potability can be determined.

There can be no objection to laying the pipe through the lake provided that it is properly done. Whether the pipe which is now being laid is the most trustworthy or not we do not feel that we are sufficiently versed in engineering matters to decide. Whatever the nature of the pipe, it could be frequently tested, and the presence of leaks could be easily recognized.

We desire to express our high appreciation of the interest exhibited by your honorable body in the sanitary welfare of the people under your care, and to join with you in the hope that Iron Mountain may soon be free from preventable disease.

THE WATER SUPPLY OF NORWAY.

REPORT OF COMMITTEE OF STATE BOARD OF HEALTH.

To the Mayor, Council, and the Health Officer of Norway, Michigan, Gentlemen:—In compliance with your request that we, members of the Michigan State Board of Health, make a report to you of the result of our inquiry into your proposed source of water-supply, the following statement has been prepared:

From our inspection we could discover no source of contamination at present either at the small lake or at the driven well.

The chemical and bacteriological examinations show that the samples taken from both of these localities are unobjectionable.

If you conclude to take the water from the lake, it would be well to remove the whole of the peaty formation between the lake and the foot of the adjacent hill. In a gallery constructed at this place around the foot of the hill so as to intercept the water before it enters the lake, and so that the gallery would not be a receptacle for water from the peaty matter around the lake, you would most probably secure an abundance of good water.

However, the cost of bringing the water from the more distant source may induce you to take your supply, permanently or temporarily, from the drive well. To this there is no objection except the great difficulty of guarding against the future possible pollution of the valley from which this water is taken, and which might take the drainage of nearly the entire city. We would caution you especially to exercise care in providing for the disposal of the sewage from the school building which is now being erected near this well. As the building is situated on ground much above the well, and as the drainage from this soil probably naturally finds its way into the valley, care must be taken to prevent contamination from this source. This, however, can easily be avoided.

In conclusion we wish to commend the wisdom which you have shown in your inquiry concerning the possible sources of water supply thus early in the growth and development of your city.

Lansing, Mich., Nov. 23, 1891.

JOHN AVERY, *President*,
VICTOR C. VAUGHAN,
MASON W. GRAY,
FRANK WELLS,
HENRY B. BAKER, *Secretary*,
Committee.

THE DIFFICULTIES IN THE WAY OF RESTRICTING THE DANGEROUS DISEASES IN DETROIT.

ABSTRACT OF THE PROCEEDINGS OF THE SPECIAL COMMITTEE OF THE STATE BOARD OF HEALTH, AT A MEETING AT THE RUSSELL HOUSE, DETROIT, MICH., APRIL 28, 1892.

The committee of the State Board of Health met in Detroit in accordance with the following resolution:

WHEREAS, More than one-tenth of the people in Michigan reside in Detroit, and communicable diseases tend to spread from that commercial metropolis to every part of the State, and,

WHEREAS, Some of the dangerous communicable diseases are uncommonly prevalent in Detroit;

Resolved, That a committee, consisting of the president and four other members of this Board, be appointed to visit Detroit, and confer with the health officer and with the board of health of Detroit and with other city officers if found desirable, with the view of learning and of reporting to this Board, so much as is possible concerning the difficulties under which the Detroit officers are laboring for the restriction and prevention of the dangerous diseases.

The meeting was called to order at 2:00 P. M. by chairman John Avery, M. D., of Greenville. The members present were: Hon. John Avery, M. D., Victor C. Vaughan, M. D., and Arthur Hazlewood, M. D. Mason W. Gray, M. D., was delayed in coming and arrived about 3:00 P. M., Henry B. Baker, M. D., was sick and could not attend.

The following named persons attended the meeting: Hon. Hazen S. Pingree, mayor of the city, John McVicar, president of the Board of Public Works, Samuel P. Duffield, M. D., health officer of the city, Drs. J. E. Clark, C. J. Lundy, J. H. Carstens, C. W. Hitchcock, H. O. Walker, H. F.

Lyster, C. G. Jennings, W. C. Stevens, L. J. Lenox, G. E. Roehrig, and Mrs. Lemkie of 546 Fifteenth Street.

Dr. Vaughan said that the Board called this meeting because they believed that scarlet fever and diphtheria were uncommonly prevalent in Detroit, and they would like to find out, if possible, the difficulties under which the Detroit officers were laboring in the restriction and prevention of the dangerous diseases; and they came with the idea of aiding, if they could, in the restriction of these diseases, and were not there for the purpose of criticising the Detroit Board.

Dr. Vaughan read a comparison of the cases and deaths from diphtheria and scarlet fever in Detroit with the State of Michigan for 1888, and in Detroit compared with New York, Chicago, and some other cities of the United States for the month of March, 1892. A hektographed copy of these comparisons was given to each person present.

Dr. Duffield said—We have many men in Detroit, who are dependent upon their daily work for the support of their families. When a child of one of these families is taken with scarlet fever, we cannot lock up the whole family including the father, in an attempt at isolation; yet Secretary Baker seems to insist that we should isolate the whole family by just that sort of method.* The Detroit Board of Health has, hitherto, had very little coöperation with, and support from, the city authorities. If we were to attempt the perfect isolation of these cases, just see how impossible it would be. There were last year 1,359 cases, an average of 136 per month. Each case would require three police, each standing guard eight hours, or 408 policemen to isolate these cases, which is more than the whole number of policemen, which now cost $500,000.

Suppose you isolated the first cases, said Dr. Vaughan, you would not have had so many; and you are going to have more next year, as they will all the time increase.

Dr. Duffield said that there is no doubt that would lessen the number of cases, but that it was just impossible for them to have perfect isolation, for reasons he had just stated. If we were to lock these families up, there would immediately be a *habeas corpus* taken out. We asked for $10,000 for contagious-disease-isolation-hospitals, and could not get it. The poor fund is exhausted, and the commission is now running on credit. It is not a lack of knowledge on the part of medical men of Detroit that prevents us handling this matter, but a lack of money. I have no power to lock a man in his house;† and, until we can get isolation hospitals, we can do no better than we are doing at present. A system of police quarantine is impossible.† If the State Board of Health can put $500,000 in our hands we might follow their instructions.† The law provides for isolation, but I have no power to lock a person up. It is impossible to quarantine a tenement house; and, if I should, the inmates would all come down with the disease. We take certain precautions in issuing permits to go to work. I cannot lock a man up unless I can provide him food.‡ I shall continue to issue permits, no matter if contrary to law.

Dr. Hazlewood asked what they did in cases of varioloid.

Dr. Duffield—We take them to the hospital for such cases, provided for by the city; and, upon recovery or death, we burn all infected clothing, and the city pays the expense.

* [No. Dr. Baker wants the State law complied with, and in that there is no authority for locking up anybody, except after conviction by a court. It requires the health officer to *order* isolation.—H. B. B.]

† [The State Board of Health's instructions are not what Dr. Duffield appears to think. H. B. B.]

‡ [This is required by law. Act 137, laws of 1883. H. B. B., *Sec. State Board.*]

Dr. Hazlewood—Do you regard small-pox as more dangerous than scarlet fever or diphtheria?

Dr. Duffield—No. Small-pox is an adult disease.

Dr. Vaughan—Many times more people die every year of diphtheria than of small-pox, in Michigan.

Dr. Lundy—Vaccination and other measures can be resorted to, to suppress small-pox.

That is so, said Dr. Vaughan, and, because there is no vaccination for diphtheria, is a good reason why diphtheria should be quarantined.

Dr. Lundy said that sometimes four or five polish families resided in the same house, and to talk about isolating a case in such a house, without its removal, was simply futile. It would cost a great deal of money to isolate these cases, but we cannot get this money. I am in sympathy with all of the work of the State Board of Health, as they are doing a great and good work; but, while in sympathy with the State Board, I wish to help our efficient health officer to explain the difficulties under which the Detroit Board is laboring.

Dr. Vaughan said, to lock five or six well children in a house with a child who has diphtheria or small-pox is not isolation, that is murder, that is what that is. Dr. Vaughan then read the law, where it provides that the board of health shall provide a hospital for small-pox or other contagious disease patients. Dr. Vaughan said that there were more people to the acre in the city of New York than in any other part of this continent; yet their death-rate would not compare with that of Detroit.

Dr. Lundy—The city of Detroit has poor sewers in some localities, and cesspools are allowed to stand.

Yes, said Dr. Duffield, and these cesspools are established by ordinance.

Dr. Carstens asked Dr. Vaughan if he knew why the death-rate was so much lower in New York than in Detroit, and Dr. Vaughan replied that it was because they had a more perfect system of isolation of dangerous diseases.

Exactly, said Dr. Carstens, they have the laws, and have the money to enforce them. Give us the same, and we will take care of the diphtheria and scarlet fever in Detroit. New York does not boast of how little its health department costs them, as does the city of Detroit. They know what the spread of these diseases means in their dense population, and they act like sensible people, and are not afraid to spend a few dollars in the restriction of disease. All we need in Detroit is the money, and we wish that the State Board of Health would help us to get it.

Drs. Lundy, Carstens, Duffield and Clark all said that money was what they wanted, and hoped that the State Board of Health would help them get it.

In reply to Dr. Vaughan's question of "What does the Detroit Board consider the dangerous communicable diseases?" Dr. Duffield said that scarlet fever, diphtheria, typhus, small-pox and glanders were placarded, and placed under rules arranged by the Detroit Board.

Dr. Vaughan asked Health Officer Duffield what was done when a case of dangerous disease was reported, for instance diphtheria.

Dr. Duffield—The patient and inmates of the infected house are given instructions, and a pamphlet of instructions is sent to the infected house.

Dr. Vaughan asked how he knew that his instructions were carried out. Do you send around a policeman to see that the instructions are carried out?

Dr. Duffield said that they depended upon the attending physician to see that the instructions were carried out; he is the custodian of the life of the patient, and we rely upon the honor of the physician to see that this is done. Dr. Carstens said he would like to catch Dr. Duffield sneaking around his patients; if he caught him at it, he thought he would give Dr. Duffield a good talking to.

Dr. Vaughan said that the State law provides a penalty to whoever disobeys the orders of the health officer, and this implies that some officer should see that his instructions are carried out.

Dr. Duffield said that he sent a policeman, with a placard to be put up, but relied upon the physician to see that the instructions of the board are carried out.

Dr. Vaughan asked who disinfected, after a person dies or recovers, in a case of scarlet fever or diphtheria, to which Dr. Duffield said: "Our Disinfector."

Dr. Vaughan asked what disinfectants were used. Dr. Duffield replied—Those recommended by the State Board of Health,—sulphur and corrosive sublimate.

Dr. Vaughan asked who was the one to give the convalescing patient permission to go out. Dr. Duffield replied that the attending physician gave that permission, and that he had no right to doubt the physician; and, so long as the law of Michigan allows quacks to practice, the public must take the consequences.

Dr. Jennings said that he did not agree with Drs. Carstens and Duffield, and that he would have no objections to the health officer coming around and looking after the sanitary affairs, as they were not expected to look after the treatment, and that he always referred any question of sanitation to the Board of Health. It is almost impossible for the profession in attending a case of contagious disease, to look after all the sanitary conditions, and do it perfectly.

Dr. Carstens said that when he was president of the Board of Health, some years ago, the law was that attending physicians could report the patient well, and that many, suffering from scarlet fever, were reported well within a week. We worked until we got the law changed so that no case of scarlet fever or diphtheria could be reported well under four weeks; but so long as druggists are allowed to prescribe for sore throats, we will have exposures to diphtheria. You cannot separate children, and the only way is to have a hospital where a child suffering from a sore throat can be isolated.

Dr. Avery said that he thought that the health officer and physicians misunderstood the object of the visit of the committee to Detroit; that they did not come there to criticise, but to see if they could be of any help in the restriction and prevention of disease. We are not law makers, cannot make the quacks get out of the State; what we wish is to get the necessary information so that we can aid you. The State Board of Health has found that public sentiment is the greatest help in their work. In the case of an outbreak of small-pox there is plenty of public sentiment, and if the health officer did not attend to his duties, the locality would force him to do so. But what we want is the proper public sentiment in the case of diphtheria and scarlet fever, and we wish to have this in Detroit. We have no trouble in the country in restricting and preventing the spread of the different diseases. (He cited instances in his resident city, Greenville, and showed how complete isolation and disinfection restricted danger-

ous diseases.) We can restrict dangerous diseases in the country, and I see no reason why you cannot do it in Detroit. The State Board of Health wishes to aid you in getting what you wish and need, and we care to have no friction between the boards.

Dr. Lundy said that he thought that the citizens of Michigan knew that the State Board of Health was doing a good work, and appreciated the great work they were doing. "I know that they have saved human lives, and have saved millions of dollars to the commonwealth of this State."

Dr. Hitchcock spoke of the law and rules relative to the removal of the placard from an infected house, and said that he had the greatest respect for the work of the State Board of Health. He also spoke of a case of diphtheria which he attended, and how he gave full instructions and orders that the extra bed in the room on which the father slept should be moved out, and when he came again he found nothing had been done; he was then very emphatic and they obeyed. He thought that an intelligent sanitary police officer would do a great deal of good, if he could happen around at the right time. People generally are afraid of a man with brass buttons, and would do for him what they would not do for a physician.

Dr. Lundy asked if it would not be productive of great good to have three or four of the sanitary officers to happen around at the right time. Just a few ought to be obtained in some way.

Dr. Duffield thought that the contagious disease hospitals would be the easiest way to get over the difficulty, and that it would be the cheapest way in the end.

Dr. Avery said he knew that the State Board of Health would be pleased to assist the Detroit board of health to get anything they needed.

Mayor Pingree said that he wished to thank the State Board for coming; and that he knew if this meeting had happened before the meeting of the board of estimates that the appropriation would have been forthcoming. He spoke of a man coming into the Detroit club rooms who had just lost a child from diphtheria, and said that this man's friends were crowding around him and condoling with him, but he was very careful to keep as far away from him as possible, as he knew that there was danger of carrying the contagion.

Dr. Vaughan again read the law relative to when the small-pox or other disease dangerous to the public health shall break out the "board of health shall immediately provide a hospital" and asked Dr. Duffield if he did not think the law ample. Dr. Duffield replied that he did. Dr. Vaughan asked what steps would have to be taken to get these hospitals.

Dr. Duffield replied that the poor fund was only $6,000, and the poor commissioner thought that a plea for hospitals to the board of estimates would get them, but we made the plea and you can see the outcome. We are expecting to have to remove our present hospital for small-pox out further, as they keep extending the city limits, and I have a proposition before the board for a series of cottage hospitals when this old hospital is abandoned, and that they be called isolation hospitals instead of pest-houses or contagious disease hospitals.

Dr. Hazlewood said that he could sympathize with a health officer in a large city, where everyone is so crowded, and that the only way was to have an isolation hospital, and that he would be in favor of a series of hospitals instead of one large building.

Dr. Vaughan asked if a few sanitary police, if they were men above the

average brightness, would not do a great deal of good in restricting the liberty of the patients and in the education of the people in sanitary matters.

Dr. Vaughan recommended that a committee consisting of Mayor Pingree, Dr. Henry B. Baker, and Health Officer Duffield, be appointed by this meeting to draw up a statement, to the common council, of the necessity of contagious-disease hospitals.

Dr. Clark thought it would be well to have included in that recommendation the largest medical society in the city so as to have as many physicians as possible interested in the matter.

Dr. Vaughan thought that it would be better to have the sanction of this meeting and bring in the medical societies later.

Dr. Jennings suggested that the recommendation be for a larger appropriation to the Board's present appropriation so that it could get its own police.

Dr. Avery asked Dr. Duffield if he thought there would be more than 100 placards out in one day, today for instance.

Dr. Duffield said that he thought there might be from 150 to 190 out that day, and that they were very much scattered.

Dr. Lundy asked Dr. Duffield if he thought that ten police would be sufficient if they were mounted.

Dr. Duffield replied that he did, and that most of the cases were outside of a radius of two and one-half miles from the City Hall. He asked what they were going to do with people they found violating the health laws, and arrested when they were sick, some of the judges do not wish to have contagious diseases brought into their presence.

Dr. Lundy asked Mayor Pingree if he did not think that they could get the money.

Mayor Pingree said he did not know that things were so bad in Detroit, and he was sure that most people in Detroit were as ignorant as himself; but if the people were educated on this subject, there would be no trouble in getting the necessary amount.

Dr. Lundy asked if there was not some way to get it before the next meeting of the Board of Estimates, and Dr. Duffield replied that an appeal to the common council might do it.

Dr. Lundy thought by a combined action of the two boards, and with the coöperation of the physicians in Detroit there would be little doubt but that they would get the money.

Dr. Lyster thought that this combined action would be a good step to take, and that the chances were good for getting the money. He also spoke of the scarlet fever which had occurred on Jefferson avenue, as occurring on the bright side of the avenue, and thought that it might be caused by the patients recovering from the disease walking on that side of the street more than on the other side.

Dr. Jennings said that he had noticed the same thing, but upon investigation found that the children having the disease were mostly attending one school, and thought that was the explanation.

The following resolutions were presented by Dr. Vaughan:

Resolved, That the Health Department should send officials frequently to infected houses to see that patients are isolated, and that other rules of the board of health are complied with.

Resolved, That we recommend a committee consisting of Mayor Pingree,

Secretary Baker of the State Board of Health, and Health Officer Duffield to draw up a statement of the great need of contagious disease hospitals.

Dr. Clark objected to the last clause of the first resolution, where it reads "that other rules of the board of health be complied with." He said that the resolution looked very simple and harmless, but if it passed it would antagonize most of the physicians in Detroit. I should not like to have a policeman come in and tell me that the patient should be moved on account of poor ventilation or recommend some other kind of treatment.

Dr. Lundy said it was a mistaken idea that the sanitary precautions should interfere with the treatment.

Dr. Clark thought that there would be a clashing between the physician and the board of health when the board of health dictated as to what should be done in the case of disinfection, etc., but Dr. Lundy thought there would be no such clashing.

Relative to the spreading of dangerous diseases in the schools, Dr. Vaughan asked Health Office Duffield what was done to let the teacher know that such a child was infected with a dangerous disease. Dr. Duffield replied that the superintendent was notified every morning of new cases, and he had postals sent to the principals of the several schools.

In connection with this subject, Mrs. Lemkie of 546 Fifteenth Street, said she had reason to believe that the principals of the schools were not always notified from the superintendent's office. She cited a case where a card was put up on a house near her residence and she immediately went to the principal of the Bagley school to see if the children of that infected house were in attendance at school, and found that they were, and that the principal had heard nothing of the existence of this diphtheria; she also found her own little boy had been looking down the throats of the children complaining of sore throat who were from the infected house.

Dr. Duffield said the fault was with the superintendent then, for his office is notified every morning between nine and ten o'clock.

Mrs. Lemkie said the difficulty was, they had a politician instead of a superintendent of schools.

Dr. Lenox corroborated what Mrs. Lemkie had stated, and in his own practice he could cite several instances where the board of education had been notified but no notice had been sent to the teacher. He also stated that he knew that convalescing children were too frequently permitted to go to school, and were the means of spreading the dangerous diseases in many instances.

Dr. Duffield said that there ought to be but little danger from spreading the diseases in that way, for the patient is held in quarantine twenty-eight days and there is a time for disinfection, and the school authorities generally require that the child be kept isolated for ten days more.

Dr. Gray (member State Board of Health), said that the lack of restriction of a child's liberty upon apparent recovery, was too frequently the source of spreading a disease, and it was at that time that a sanitary inspector would do the greatest good, to see that convalescents were isolated from the public. Several sanitary inspectors to drop down on an infected locality at the right time, would aid Health Officer Duffield very much is his public-health work.

Dr. Duffield said that there were no sanitary policemen on his pay-roll, but that he had the privilege to use some of the police from the city department for the purpose of placing placards, etc., but would be very glad indeed, to have a number for his special use.

Dr. Lenox thought that sanitary police would be the means of making many physicians angry, for he had already complaints that the police were often impertinent and isolent in the discharge of their duties. He thought that the attending physician was the best detective to see that the rules and instructions of the Board of Health were complied with.

Dr. Clark made a motion to strike out that part of the first resolution where it read "that other rules of the Board of Health be complied with." The motion was lost.

A vote was taken on the adoption of the resolutions as read, but the chairman was unable to decide, and called for a rising vote which adopted the resolutions.

On motion the committee adjourned at 5:00 P. M.

EXTRACTS FROM THE PROCEEDINGS AT THE REGULAR MEETING OF THE STATE BOARD OF HEALTH, AT LANSING, JULY 12, 1892, RELATING TO THE RESTRICTION OF DANGEROUS DISEASES IN DETROIT.

D. W. H. Moreland sent a communication, of which the following is an abstract:—

"As you will see by my card, enclosed, I live in Detroit, and in soliciting freight and passenger business there I get around the city considerably, and am forced to notice the extremely filthy condition of the alleys and back yards, where there are accumulated *hundreds of tons* of garbage, in a putrefying condition, which have accumulated since the shutting down of the garbage works nearly a year ago. The proper authorities of the city of Detroit, with shame to themselves, should be forced to do something for the proper collection and disposal of the city's garbage. * * * * There is such an immense volume of travel constantly in and out of Detroit from the State at large, that you certainly do right to insist on an explanation from the city authorities, and a prompt and effective remedy. The Board of Health in Detroit are practically powerless in the matter, but the mayor, aldermen and Board of Public Works are to blame, particularly the mayor and *aldermen*. The amount of infectious diseases, particularly diphtheria and scarlet fever, which the city has been inflicted with the last few months, is a disgrace to the city and the State at large, and to any civilized country on God's green earth."

Replies to questions in the schedules, used by the committee, have been received by mail from a number of physicians and other citizens of Detroit.

Dr. David Inglis says, relative to work to obtain coöperation of citizens, "I think the sanitary conventions [under the auspices of the State Board of Health] have been of incalculable benefit, and I do not see why a series of local or ward sanitary meetings in Detroit could not be carried out." * * * "In the supervision of plumbing and drainage in new buildings we are far behind New York, Washington, or Buffalo; every plumber does as he sees fit; drainage is done in a reckless way. We will never get rid of diphtheria by placards, disinfectants, quarantine or any expedients as long as our clay soil is saturated from loosely-jointed crock drains running under cellar floors."

Dr. W. B. Sprague replied to many of the questions in the schedules, and from his replies one would infer that everything possible to be done was being done in Detroit to restrict dangerous diseases. There being doubt as to whether Dr. Sprague understood the questions to apply to the city as a whole, he was asked to explain, and he says his replies related to his own practice only.

Dr. Charles W. Hitchcock replied to a number of the questions. He, also, seems to have replied mainly concerning his own practice.

There is no question that, in the practice of the most intelligent and philanthropic physicians, the proper measures for the restriction of the

dangerous diseases are ordered, and, so far as the physician alone can do so, they are enforced; but not all families, in time of great trial, will conform to restrictive measures, not for their own good but for the benefit of the public; and the physician's duty is primarily to the family that employs him; the public interests are to be watched and guarded by the physicians (health officer and Board of Health) and other officials employed and paid by the public for that especial service.

The set of schedules which the committee left with the health officer, to be filled out by him, have not been received from him. No response has been received from any medical member of the Detroit Board of Health.

James E. Pittman, Superintendent of Police, replied to two questions, relative to what is done with reference to dangerous communicable diseases, that "The members of the Detroit police force have acted under instructions from the health officer." Replying to what is done—"Whatever is directed by the health officer."

The only response by any member of the Detroit Board of Health to the requests for replies to the schedules, stating the specific facts as to just what are the methods generally employed in Detroit, is as follows:—

Hon. Frank J. Hecker, president Metropolitan Police, and member of the Detroit Board of Health, referring to the schedules and requests for facts, replied "I beg to advise you that I have referred the same to Dr. Samuel P. Duffield, health officer of this city, as I have no personal knowledge of the subject matter thereof."

In the absence, from this meeting of the State Board, of the chairman of the committee, this subject was not finally disposed of, but the following is a—

Summary of the Most Important Facts Learned Concerning the Difficulties in Restricting Dangerous Diseases in Detroit. What is done in Detroit, Compared with what the State Board of Health has Generally Recommended.

According to the evidence collected, Dr. Duffield does not appear to understand the views of the Secretary of the State Board of Health, nor the system of work recommended by the State Board. The Secretary of the Board does not advise that the local health officer, as Dr. Duffield expresses it, "lock up the whole family," in any case. There is no State law directly authorizing that. The Secretary recommends that the health officer comply with the State laws, especially with Act 137, laws of 1883, which (unless he is directed by his local board to do otherwise), requires the health officer—

"To order the prompt and thorough isolation of those sick or infected with such disease, so long as there is danger of their communicating the disease to other persons; to order the prompt vaccination or isolation of persons who have been exposed to small-pox; to see that no person suffers for lack of nurses or other necessaries because of isolation for the public good; to give public notice of infected places by placard on the premises, and otherwise if necessary; to promptly notify teachers or superintendents of schools concerning families in which are contagious diseases; to supervise funerals of persons dead from scarlet fever, diphtheria, small-pox, or other communicable disease which endangers the public health; to disinfect rooms, clothing, and premises, and all articles likely to be infected, before allowing their use by persons other than those in isolation; to keep the president of his own board of health, and the Secretary of the State Board of Health, constantly informed respecting every outbreak of a disease dangerous to the public health, and of the facts so far as the same shall come to his knowledge, respecting sources of danger of any such diseased person or infected article being brought into or taken out of the township, city or village of which he is the health officer."

If the health officer gives these orders, as the law requires, then any person who disobeys one of these orders is liable to a fine, and to impris-

onment if the fine is not paid. If each case is, as it should be, kept under surveillance by the health officer, through his agents, who may be sanitary policemen or sanitary inspectors, any violation of the orders may be learned and the legal penalties inflicted. If, in Detroit, this were generally done, it would soon be generally known, and the laws and orders would generally be obeyed. It seems that in Detroit this law is not fully complied with by the health officer, that the isolation of infected households is not ordered, but only advised, that no sanitary inspector finds out whether or not the order or advice is complied with, and, therefore, that no thorough, systematic attempt is made to isolate inmates of houses infected with diphtheria and scarlet fever; permits are given for adults to go out from infected premises to work. So long as the most important law for the restriction of disease is disregarded by the chief officer of health in the city, or negatived by the action of the local board of health, there is little hope for progress in the restriction of the dangerous communicable diseases. It is not to be wondered at, it follows as a matter of course, that diphtheria and scarlet fever are very prevalent in Detroit.

The committee seem to have found that perhaps the most important "difficulty under which the Detroit officers are laboring for the restriction of the dangerous diseases" is the lack of coöperation with the health officials by the other city officers, and by the people generally. This was testified to by his honor the Mayor, by Dr. Duffield, and by others; it was spoken of by President Avery of the State Board of Health; Mayor Pingree expressed the view that if the citizens of Detroit and their official representatives knew the facts they would readily respond to the proper requests of the health department. This is in accordance with the experience of the State Board of Health, and with the theory of its system of work, which is not accepted and acted upon by the Detroit health department. The theory of the State Board is that an "educational campaign" should be *continually* carried on for the purpose of building up a correct public opinion on the restriction of the most dangerous diseases. The State Board issues pamphlets on the best measures for the restriction of each of the most dangerous diseases, and it wants these pamphlets distributed, by the local health department, *to the neighbors of every house* in which there is a dangerous communicable disease. In time, if this is done, all the people are thus reached, at a time of special danger from disease, when the pamphlet is read because of unusual interest, and heeded because issued by State authority, and the result is a public sentiment that will sustain and support proper health measures, carried on by the local health department.

In Detroit, a pamphlet, issued by the local board, is left with the inmates of the infected premises; but there the "educational campaign" stops, the people are left uninstructed, and the health officials continue to be powerless, for lack of coöperation, not only of the people generally, but also of those other city officials who control the appropriation and expenditure of money; isolation hospitals are not provided for, because few of the people have been instructed concerning the necessity or importance of isolation for the restriction of the most common diseases; disinfecting stations are not provided, because few of the people know how important disinfection is, for the restriction of diphtheria and scarlet fever.

The State Board of Health issues a diagram which shows at a glance, and conclusively, because representing indisputable statistics, the two important facts—that isolation and disinfection do restrict diphtheria. It

issues a diagram that shows these same two important facts concerning scarlet fever. One of these diagrams, with a copy of the State Board's pamphlet on the restriction of the disease then threatening, should be placed before every neighbor of a house in which there occurs a case of one of these diseases. If this were done in Detroit, it would not be long before there would be an enlightened public opinion which would tend to support the local health officials in proper efforts for the restriction of those two dangerous communicable diseases which are now so prevalent in Detroit.

HENRY B. BAKER,
Secretary.

WORK OF THE OFFICE OF THE SECRETARY OF THE STATE BOARD OF HEALTH DURING THE FISCAL YEAR ENDING JUNE 30, 1892.

For each regular meeting of the State Board of Health the Secretary prepares a report of work in the Office during the preceding quarter. The abstracts of these might be published with the proceedings of the several meetings; but are collected and published here in order to bring the report of work in the Office all together. Following these quarterly reports will be found a general report for the year.

ABSTRACTS OF SECRETARY'S QUARTERLY REPORTS OF WORK IN THE OFFICE, DURING YEAR ENDING JUNE 30, 1892.

SECRETARY'S REPORT OF WORK IN THE OFFICE OF THE BOARD DURING QUARTER ENDING SEPT. 30, 1891.

Dangerous Communicable Diseases.

The numbers of reports of outbreaks of dangerous communicable diseases in Michigan, received from all sources and filed, and the corresponding number concerning which action was taken by this office, during the quarter, are as follows: for diphtheria, 150; for scarlet fever, 127; for typhoid and typho-malarial fever, 169; for measles, 43; small-pox, 3. Total for the six diseases, 492.

Small-pox was reported during the quarter as follows:

From Cheboygan, Aug. 15, one case; from Detroit, Sept. 12, one case; from St. Joseph, Sept. 21, one case. No death from small-pox was reported during the quarter.

Dr. S. A. St. Amour, health officer of the city of Cheboygan, reported the outbreak of small-pox as over, on Sept. 1. The health officers of Detroit and St. Joseph have not yet made final reports.

The number of communications relative to dangerous communicable diseases, received and placed on file during the quarter, was 1,280.

Relative to dangerous communicable diseases, letters, written cards, and demands for weekly or final reports, on cards, or in the form of the circular letter, were sent out during the quarter, to the number of 1,330.

The "Final" reports of outbreaks received and filed during the quarter, were: for diphtheria, 88; scarlet fever, 86; typhoid and typho-malarial fever, 21; measles, 33; small-pox, 1. Total for the six diseases, 230.

During the quarter, the local columns of newspapers to the number of 2,275, have been looked over for reports of occurrence of communicable diseases. This has resulted in giving this office information of the alleged occurrence of 15 outbreaks of diphtheria, 7 outbreaks of scarlet fever, 42 outbreaks of typhoid and typho-malarial fever, 7 outbreaks of measles, and one outbreak of small-pox. To what extent the reports of these alleged outbreaks were verified, is shown in the accompanying table.

TABLE 1.—*Showing the number of Outbreaks of Diphtheria, Scarlet fever, Typhoid fever, Measles, and Small-pox, from July 1 to Sept. 30, 1891, of which notice was received at the office of the Michigan State Board of Health; the per cent of reports, information concerning which was received through the Newspapers; the per cent of newspaper reports which were confirmed by the health officer; the per cent of newspaper reports which were denied by the health officer, and the per cent to which no reply was received from the health officer.*

Diseases.	Reports from *all* sources, July 1—Sept. 30, 1891.	Per cent of all reports which were obtained from the newspapers.	Per cent of newspaper reports which were confirmed by the health officer.	Per cent of newspaper reports which were denied by the health officer.	Per cent of newspaper reports to which the health officer made no reply to notice sent from this office.
Diphtheria	150	10	47	20	33
Scarlet fever	127	6	86	14	0
Typhoid fever	169	25	43	21	36
Measles	43	16	29	14	57
Small-pox	8	33	100	0	0
Averages for the four Diseases		18	61	14	25

Accessions to the Library, and Card-Cataloguing.

During the quarter, three hundred and sixty-two (362) current numbers of journals (weeklies, monthlies, and semi-monthlies), and one hundred and twenty-six (126) books and pamphlets have been added to the library of the Board; and the usual amount of work has been done on the card-catalog of the library.

Compiling, Editing, Printing, etc.

Considerable progress was made in the preparation of the article on diphtheria, for the Annual Report of 1890.

Manuscripts for the Centreville and Negaunee Sanitary Conventions

have been collected and arranged, and the editing of the Proceedings of these Conventions is about one-half finished.

A list of the names and addresses of the health officers in this State for 1891–92 has been compiled and printed.

Hektograph Work.

Hektograph work amounting to 2,576 pages was done, among which were copies of reports of examinations of plans for a cottage for Dangerous and Criminal Insane, at Ionia; for building at the Northern Asylum for Insane, at Traverse City; and a school building at the State Industrial Home for Girls, at Adrian; synopsis of meeting of the Board, July 14, 1891; resolutions of the Board in regard to retiring members; copy of a letter from Dr. Christian, "Typhoid Fever suspected to be caused by milk"; Interstate Notifications of small-pox at Cheboygan and St. Joseph, Michigan; copy of "Investigation of outbreak of Typhoid Fever at Baraga, Michigan"; letter from Dr. A. B. Cornell, relative to adulterated milk; "Causation of Dysentery by Amœbæ"; "Look out for Scarlet Fever"; copy of a letter from Dr. Henry B. Baker, to the Free Press; copy of "Analysis of fluid with which to make Fraudulent Milk"; casualties, from the use of kerosene oil, etc.

Return of the Name and Post Office Address of the Health Officer, as required by Law.

In April, 1891, the first demand was made on supervisors of townships, clerks and presidents of villages, and clerks and mayors of cities for the return of the name and post-office address of the health officer for the ensuing year. In June a "second demand" was made in cases where the name of the health officer had not yet been returned. But still there were some jurisdictions delinquent, and the Secretary did not wish to print the list of health officers in Michigan in 1891-92, until every effort was made to obtain returns from the delinquent localities. August 12, a circular letter was planned to go to those delinquent localities placing the law forcibly before the local authorities, that the State law should be complied with, and the name and post-office address of the health officer be returned to the Secretary of the State Board of Health, whether the health officer should be a newly-appointed one or the one who was appointed and qualified for the preceding year and holding over until his successor shall have been appointed and qualified. Practically the same letter went to the supervisor of the township, as went to the clerks of villages and cities. A similar letter went to the "health officer, in 1890," asking that health officer if he understood that he was now health officer and would continue in office until his successor was elected (appointed) and qualified. These letters are printed, as follows:

MICHIGAN STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY,
Lansing, Mich., August 12, 1891.

Clerk of the Board of Health of the _____
(City or village.)

DEAR SIR:—I have been unable to learn from you or the president of your board, whether or not a health officer has been appointed for your village this year.

The law requires that "every board of health shall appoint and constantly have a health officer,"—§1634 Howell's Statutes.

For the jurisdictions for which the name and post-office address of the health officer is not reported to this office, the clerk will be required, under § 1629 Howell's Statutes, to make special reports during the year, concerning all outbreaks of "diseases dangerous to the public health."

Our list of names of health officers for the year 1891 is ready for the printer, and I shall be pleased to learn that a health officer has been appointed for your board. If notice is received in time this will prevent its being necessary to print your locality as delinquent.

Herewith is an envelope for your response.

Very respectfully,

HENRY B. BAKER, *Secretary.*

MICHIGAN STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY,
Lansing, Mich., August 12, 1891.

Health Officer, in 1890, of the _____
(Township, city or village.)

DEAR SIR:—I have been unable to learn from the clerk or president of your local board of health whether your successor has been appointed, or whether you have been reappointed as health officer for the year 1891. From the Attorney General of Michigan, I learn that in this State an officer continues in office until his successor is elected (or appointed) and qualified,—this would seem to be the intention of the law concerning health officers, because it says "every board of health shall appoint and constantly have a health officer."—§ 1634 Howell's Statutes.

Our list of health officers for the year 1891-2 is ready for the printer, and before entering your name on the list, or printing the delinquency in the local health officers, I would be glad to hear from you, as to whether you understand that you are now the health officer of the village.

Very respectfully,

HENRY B. BAKER, *Secretary.*

Distribution of Publications during the third quarter of 1891.

About 2,670 copies of the Annual Report for 1889 were distributed to the following: Members and ex-members of this Board; sanitary journals and exchanges; secretaries and members of other State Boards of Health; secretaries of State medical societies; correspondents; meteorological observers and exchanges; libraries; health officers, etc., in other States; health officers of cities, villages and townships, and mayors of cities and presidents of villages, in this State for the year 1890–91; and to sanitarians in this and other States.

About 1,700 copies of the leaflet on the prevention of small-pox were sent to health officers of townships, clerks of cities and villages, mayors of cities, and presidents of villages.

About 1,150 copies each of the following: Abstract of the Proceedings of the Michigan State Board of Health, April, 1891; leaflet on the Dangerous Contagious Diseases; pamphlet on the restriction and prevention of measles; and the pamphlet on the restriction and prevention of consumption, were distributed to the following: Members and ex-members of this Board; sanitary journals and exchanges; meteorological observers and exchanges; secretaries of State Boards of Health; secretaries of State Medical Societies; members of the Michigan State Board of Corrections and Charities; health officers of townships (not including Abstract of Proceedings), villages and cities in this State; and to health officers, etc., of other States. Two copies each of the leaflet on the dangerous contagious diseases, the pamphlet on the restriction of measles, and the pamphlet on the restriction and prevention of consumption were sent to 558 newspapers in Michigan.

Copies of the paper on "The Care of Children During Hot Weather," were sent to 225 editors of newspapers.

Rather more than the usual number of pamphlets on the restriction and prevention of the dangerous communicable diseases have been sent during the quarter, where those diseases were reported to be present.

There were 1,440 copies of the pamphlet, "Names and Addresses of Health Officers in Michigan for the year 1891–92," sent to the health officers of cities, villages and townships, and to the presidents of all local boards of health where the name of the health officer had not been returned to this Office.

About 4,050 copies of the proceedings of the Alpena, Charlevoix and Niles Sanitary Conventions were distributed to the following: Presidents, vice-presidents, committees and all who took part in the conventions; members and ex-members of this Board; secretaries of other State Boards of Health; secretaries of State Medical Societies; sanitary and other journals—exchanges; meteorological observers and meteorological exchanges; members of the Michigan State Board of Corrections and Charities; regular correspondents; libraries; health officers, etc., of other States; Michigan State Institutions; health officers of cities and villages in Michigan; sanitarians in Michigan; and presidents and secretaries of previous sanitary conventions.

Account of Work done on Meteorology during the third quarter of 1891.

A summary of the meteorological conditions, by weeks and months, at this Station has been made, for use in connection with the weekly and monthly bulletins—"Health in Michigan," and the monthly summary sent each month to the Chief of the Weather Bureau at Washington, D. C.

The meteorological tables for 1890 are completed, and the footings and averages of temperature, per cent of cloudiness, direction of the wind, day and night ozone, daily range of temperature, and rainfall, are made on the registers at from 13 to 21 stations, and the relative humidity has been "called in" for ten stations, for the months January to August, inclusive, in 1891.

The supply of ozone-test paper for the coming quarter was mailed to sixteen meteorological observers on Sept. 15.

Diagrams were made as follows:

1. One diagram in photo-engraving ink—"The Great Frost of 1890–1891," reproduced from the Journal of the Royal Meteorological Society of Great Britain, April, 1891.
2. Two diagrams in photo-engraving ink illustrating a paper on water-supply at Centreville, Mich.
3. Hecktograph copies from a diagram—"Sickness in Michigan from Influenza and the Average Atmospheric Temperature in each of the seven years, 1877–83."
4. Hecktograph copies from a diagram—"Sickness in Michigan from Influenza and the Average Atmospheric Temperature in each of the six years, 1884–89."
5. Hecktograph copies of a working blank for making up weekly reports of Average Atmospheric Pressure.

6. One diagram in photo-engraving ink "Diphtheria in Michigan in 1889."

7. Five diagrams in photo-engraving ink, based on the—Weekly Reports of Sickness in Michigan, in 1889,—and exhibiting the rise and fall of all the important diseases, to accompany the article on "Causes of Diseases," in the Annual Report for 1890.

Reports of work in connection with Sickness Statistics.

During the third quarter of 1891, 2,490 postal cards, 166 record books, 48 copies of printed instructions and 21 letters of written instructions regarding weekly card reports were sent to 166 health officers and regular correspondents, 160 circular hektographed letters were mailed to delinquent health officers, 65 hektographed letters were mailed regarding the "Sanitary News"; the weekly card reports received were entered and compiled; 41 copies of the hektographed weekly bulletin "Health in Michigan" were mailed each week, and 97 copies of the monthly bulletin "Health in Michigan," have been hektographed and mailed each month. These bulletins have also been consolidated for the quarterly report made today. Work has been done on the compilation of the weekly card reports of sickness, for the Annual Report.

Health in Michigan in the third quarter of 1891. Communicable Diseases.

Compared with the preceding quarter (April, May and June), reports from all sources show *typhoid fever* to have increased by an average of *seventy-four* places, *measles* to have decreased by an average of *fifty-eight* places, *scarlet fever* to have increased by an average of *thirteen* places, and *diphtheria* to have increased by an average of *twenty* places; *small-pox* was reported at *two* places during this quarter.

Meteorology at one Central Station, and Sickness throughout Michigan from all Causes, third quarter of 1891, compared with the preceding quarter.

A comparison of meteorological conditions at Lansing during the third quarter of 1891, with the meteorological conditions of the preceding quarter, shows the prevailing direction of the wind to have been west (instead of northeast), the velocity 7 per cent less, the temperature 9.50 degrees higher, the rainfall at Lansing one inch more, the absolute, and the relative humidity more, the day, and the night ozone considerably less and the depth of water in the well at Lansing to have been four inches less.

Compared with the preceding quarter (April, May and June), the reports from regular observers show a marked increase of small-pox, cholera infantum, cholera morbus, dysentery, typhoid fever, typho-malarial fever, whooping-cough, diarrhea, inflammation of bowels, diphtheria, remittent fever, intermittent fever and inflammation of brain; and a marked decrease of membranous croup, pneumonia, measles, influenza, pleuritis, erysipelas, bronchitis, puerperal fever and tonsillitis in the third quarter of 1891.

The Weather and the Health in Michigan, in the third quarter of 1891, Compared with the average for the third quarters in the five years 1886–1890.

A comparison of the meteorological conditions at Lansing in the third quarter of 1891, with the average for the third quarters in the five years, 1886–1890, shows that in 1891, the prevailing direction of the wind was the same (west), the velocity was 8 per cent greater, the temperature was slightly higher, the rainfall at Lansing was .79 of an inch more, the absolute, and the relative humidity were slightly less, the day, and the night ozone were less, and the depth of water in the well at Lansing was 6 inches less.

Compared with the average in the corresponding quarters in the five years, 1886–1890, the reports indicate that scarlet fever and cerebro-spinal meningitis were more than usually prevalent, and that membranous croup, typho-malarial fever, small-pox, erysipelas and puerperal fever were less than usually prevalent in the third quarter of 1891.

The prevalence of typhoid fever for the third quarter of 1891, was nearly the same as for the average of the third quarters in the five years, 1886–1890, but for the last month—September, 1891, the reports show twenty-nine per cent more sickness from typhoid fever than the average for September in the preceding five years.

SECRETARY'S QUARTERLY REPORT OF WORK IN THE OFFICE OF THE BOARD DURING THE QUARTER ENDING DECEMBER 31, 1891.

Dangerous Communicable Diseases.

The number of reports of outbreaks of dangerous communicable diseases in Michigan, received from all sources and filed, and the corresponding number concerning which action was taken by this office, during the quarter, are as follows: for diphtheria, 175; for scarlet fever, 138; for typhoid and typho-malarial fever, 169; for measles, 19. Total for the five diseases, 501. No small-pox was reported in Michigan.

The number of communications relative to dangerous communicable diseases, received and placed on file during the quarter, was 1,773.

Relative to dangerous communicable diseases, letters, written cards, and demands for weekly or final reports, on cards, or in the form of the circular letter, were sent out during the quarter, to the number of 1,687.

The "Final" reports of outbreaks received and filed during the quarter, were: for diphtheria, 122; scarlet fever, 74; typhoid and typho-malarial fever, 110; measles, 9. Total for the five diseases, 315.

During the quarter, the local columns of newspapers to the number of 2,497 have been looked over for reports of occurrence of communicable diseases. This has resulted in giving this office information of the alleged occurrence of 25 outbreaks of diphtheria, 21 outbreaks of scarlet fever, 50 outbreaks of typhoid and typho-malarial fever, and 3 outbreaks of measles. To what extent the reports of these alleged outbreaks were verified, is shown in the accompanying table.

TABLE 1.—*Showing the number of Outbreaks of Diphtheria, Scarlet fever, Typhoid fever and Measles, from Oct. 1 to Dec. 31, 1891, of which notice was received at the office of the Michigan State Board of Health; the per cent of reports, information concerning which was received through the Newspapers; the per cent of newspaper reports which were confirmed by the health officer; the per cent of newspaper reports which were denied by the health officer, and the per cent to which no reply was received from the health officer.*

Diseases.	Reports from *all* sources, Jan. 1—Mar. 31, 1891.	Per cent of all reports which were obtained from the newspapers.	Per cent of newspaper reports which were confirmed by the health officer.	Per cent of newspaper reports which were denied by the health officer.	Per cent of newspaper reports to which the health officer made no reply to notice sent from this office.
Diphtheria	175	14	48	20	32
Scarlet fever	138	15	33	19	47
Typhoid fever	169	30	42	26	32
Measles	19	16	67	33	0
Averages for the four Diseases		19	48	25	28

Compilation, etc.

The article on diphtheria in Michigan during the year ending December 31, 1889, for the Annual Report of 1890, has been completed and sent to the State Printer. The article on small-pox for the same year and Report is nearly ready for the printer. The article on scarlet fever for the same year and Report is about one-fourth compiled. The article on alleged nuisances for the same year and Report is now prepared for the printer.

Casualties from the use of illuminating oils in 1889 and 1890 have been compiled, and those for 1891 are nearly compiled.

Distribution of Publications of the Board.

About 150 copies of the Proceedings of the Negaunee Sanitary Convention have been sent to those who took part at the convention, and for distribution at Negaunee.

About 30 copies of the Proceedings of the Centreville Sanitary Convention have been sent to those who took part in that convention.

Copies of the Proceedings of the two Sanitary Conventions at Negaunee and Centreville have been sent to each member and ex-member of this Board, to secretaries of State Boards of Health, sanitary journals and exchanges, meteorological observers and exchanges, members of Board of Corrections and Charities, and to presidents and secretaries of previous conventions.

The usual number of pamphlets on the restriction and prevention of the dangerous communicable diseases have been distributed where those diseases were present; also several hundreds of these pamphlets were distributed at the Convention at Iron Mountain.

Sanitary Conventions.

Papers, addresses, and discussions at the Negaunee and Centreville Sanitary Conventions have been edited and sent to the State Printer, proofs have been read, and the Proceedings have been received in printed form. The papers, addresses, and discussions at the Iron Mountain Convention have nearly all been received, and their editing is begun.

Accessions to the Library.

During the quarter 118 books and pamphlets and 387 numbers of current journals have been added to the Library of the Board.

Correspondence, etc.

Aside from postal cards, printed circulars, etc., which are not copied in letter books, 1,210 pages of letter books have been used in copying the correspondence of the Office; and 2,516 pages have been hektographed. The following are some of the subjects on which there has been correspondence:—

1. Immigrant Inspection at Port Huron and Detroit.
2. Immigrant Inspection at Portland, Me.
3. Reply to a circular letter from P. H. Bryce, inciting Boards of Health against "Inspection of Immigrants."
4. Notification of names and destination of immigrants from infected ports or vessels.
5. Casualties caused by kerosene.
6. Correspondence with Charles R. Whitman, Commissioner of Railroads, relative to the absence of privies in stations at small places.
7. Correspondence relative to transportation of dead bodies.
8. Correspondence with local health officials relative to the restriction and prevention of communicable diseases.

Envelopes have been addressed for sending the Proceedings of the Negaunee and Centreville Conventions to 556 persons, but for lack of postage they cannot be sent until after the meeting of the Board.

Envelopes have been addressed to the health officers of cities, villages, and townships for sending blanks for making their annual reports to this office as soon as the State Printer gets the blanks printed.

Miscellaneous.

Work on the card catalogue of the Library has been continued, and the usual accounts of the Office have been kept.

Work Done in Meteorology.

A summary of meteorological conditions during this quarter by weeks and months, at this station, has been made, for use in connection with the weekly and monthly bulletins, "Health in Michigan," and the monthly summary has been sent, each month, to the Weather Bureau at Washington, D. C.

Monthly footings and averages of tri-daily observations of barometer, temperature, cloudiness, absolute and relative humidity, direction and

velocity of the wind, day and night ozone, daily range of temperature, and rainfall, have been made on meteorological registers at from 6 to 21 stations in Michigan, for the months of September, October, and November.

Proof has been read on the article in the Annual Report for 1890, on meteorology for the year 1889, and copies of the printed forms are now on file in this Office.

The supply of blank meteorological registers, envelopes, postal cards, etc., for use during the year 1892, and a three-months supply of ozone test-paper were mailed to the observers for this Office, December 15, 1891.

The following diagrams were made during the quarter:

Photo-engraving ink diagram, "Typhoid fever and proximity of wells to privies in Iron Mountain, Mich." (copied and reduced from original.)

Photo-engraving ink diagram, "Sickness from Pneumonia and Average Temperature in Michigan for a period of 8 years, 1877–84."

Photo-engraving ink diagram, "Velocity of the Wind by Hours and Months at this Office for 1890," for the Ann. Report for 1891.

Photo-engraving ink diagram, "Average Temperature at Stations in Michigan for 1890," for the Annual Report for 1891.

Pencil diagram, "Sickness from Pneumonia and Average Temperature in Michigan for a period of 13 years, 1877–89," for study in this Office.

Pencil diagram, "Sickness from Pneumonia, Average Temperature for a Period of 4 years, 1886–89."

Report of work in connection with sickness statistics.

During the fourth quarter of 1891, 1,410 postal-card blanks, and 94 blank record books were sent to 94 health officers and regular correspondents; the weekly card reports received were entered and compiled; 43 copies of the hektographed weekly bulletin, "Health in Michigan," were mailed each week and 97 copies of the monthly bulletin, "Health in Michigan," have been hektographed and mailed each month.

These bulletins have also been consolidated for the quarterly report, made today. Work has been done on the compilation of the weekly card reports of sickness, for the Annual Report.

Meteorology at one Central Station, and Sickness throughout Michigan from all Causes, fourth quarter of 1891, Compared with the preceding quarter.

A comparison of the meteorological conditions at Lansing during the fourth quarter of 1891, with the meteorological conditions of the preceding quarter shows the prevailing direction of the wind to have been from the same quarter (west), the average velocity to have been 4.3 miles per hour greater, the temperature to have been much lower, the absolute humidity much less, the relative humidity slightly more, the day and night ozone less, the rainfall to have been 0.83 of an inch less, and the ground water in the well to have been six inches less, in the fourth quarter of 1891.

Compared with the preceding quarter (July, August and September), the reports from regular observers show a marked increase of membranous

croup, pneumonia, influenza, pleuritis, erysipelas, bronchitis and diphtheria, and a marked decrease of small-pox, measles, cholera infantum, cholera morbus, tonsillitis, dysentery, cerebro-spinal meningitis, diarrhea, puerperal fever and whooping-cough, in the fourth quarter of 1891.

Fourth Quarter of 1891, Compared with the Average for the five years, 1886–1890.

A comparison of the meteorological conditions at Lansing in the fourth quarter of 1891, with the average for the fourth quarters in the five years 1886–1890, shows that in 1891, the prevailing direction of the wind was west (instead of southwest), the velocity was 2.1 miles per hour greater, the temperature was higher, the absolute humidity was slightly more, the relative humidity was less, the day and night ozone were less, the rainfall was 2.1 inches more and the ground water in the well to have been seven inches less in the fourth quarter of 1891. Compared with the average in the corresponding quarters in the five years 1886–1890, the reports received from regular observers indicate that cholera morbus, dysentery, influenza, cholera infantum, and typhoid fever were more prevalent, and that small-pox, measles, typho-malarial fever, puerperal fever, cerebro-spinal meningitis and whooping-cough were less than usually prevalent in the fourth quarter of 1891.

Health in Michigan in the fourth quarter of 1891. Communicable Diseases.

Compared with the preceding quarter (July, August and September), reports from all sources show *diphtheria* to have increased by an average of *twenty-seven* places, *scarlet fever* to have decreased by an average of *three* places, *typhoid fever* to have increased by an average of *twenty-nine* places and *measles* to have decreased by an average of *sixteen* places. No *small-pox* was reported during this fourth quarter but at *two* places during the preceding quarter.

SECRETARY'S REPORT OF WORK IN THE OFFICE OF THE BOARD DURING THE QUARTER ENDING MARCH 31, 1892.

Correspondence, Etc.

During the first quarter of 1892, 1,160 pages of letter books have been used in copying the correspondence of the Office (not including postal cards and printed circulars).

During the quarter 993 pages were hektographed, among which were many notifications to local health officials of immigrants, from infected ships, destined for points in Michigan. There were also included in this hektograph work, paragraphs for the press, for members of the Board, or for other use, as follows:—"Scarlet Fever Spread from Detroit," "Diphtheria," "Look out for Typhus Fever," "Leprosy in the Northwestern States of America," a letter to the Editor of the Detroit Journal, and a large number of extracts from reports of different scientists bearing on the period of incubation and duration of infectiousness of the various communicable diseases.

Dangerous Communicable Diseases.

The number of reports of outbreaks of dangerous communicable diseases in Michigan, received from all sources and filed, and the corresponding number concerning which action was taken by this office, during the quarter, are as follows: for diphtheria, 125; for scarlet fever, 209; for typhoid and typho-malarial fever, 53; for measles, 34. Total for the five diseases, 421. No small-pox was reported in Michigan.

The number of communications relative to dangerous communicable diseases, received and placed on file during the quarter, was 1,466.

Relative to dangerous communicable diseases, letters, written cards, and demands for weekly or final reports, on cards, or in the form of the circular letter, were sent out during the quarter, to the number of 1,518.

The "Final" reports of outbreaks received and filed during the quarter, were: for diphtheria, 91; scarlet fever, 111; typhoid and typho-malarial fever, 61; measles, 12. Total for the five diseases, 275.

During the quarter, the local columns of newspapers to the number of 2,172 have been looked over for reports of occurrence of communicable diseases. This has resulted in giving this office information of the alleged occurrence of 18 outbreaks of diphtheria, 23 outbreaks of scarlet fever, 15 outbreaks of typhoid and typho-malarial fever, and 8 outbreaks of measles. To what extent the reports of these alleged outbreaks were verified, is shown in the accompanying table:

TABLE 1.—*Showing the number of Outbreaks of Diphtheria, Scarlet fever, Typhoid fever and Measles, from Jan. 1 to March 31, 1892, of which notice was received at the office of the Michigan State Board of Health; the per cent of reports, information concerning which was received through the Newspapers; the per cent of newspaper reports which were confirmed by the health officer; the per cent of newspaper reports which were denied by the health officer, and the per cent relative to which no reply was received from the health officer.*

Diseases.	Reports from *all* sources, Jan. 1—March 31, 1892.	Per cent of all reports which were obtained from the newspapers.	Per cent of newspaper reports which were confirmed by the health officer.	Per cent of newspaper reports which were denied by the health officer.	Per cent of newspaper reports to which the health officer made no reply to notice sent from this office.
Diphtheria	125	14	33	17	50
Scarlet fever	209	11	26	17	57
Typhoid fever	53	28	13	27	60
Measles	34	24	63	0	38
Averages for the four diseases		19	34	15	51

About the usual number of pamphlets published by this Board on the restriction and prevention of the different dangerous communicable diseases (scarlet fever, diphtheria, typhoid fever, measles, etc.) have been distributed during the quarter to localities where outbreaks of those diseases have occurred.

Compiling and Editing for Publication, Etc.

Articles on Diphtheria, Small-pox and Measles, in Michigan in 1889, for the Annual Report for 1890, have been sent to the printer and the proof thereof read. The article on nuisances for the same year, has been compiled ready for the printer. Reports relative to Scarlet Fever and Typhoid Fever for the same year, have been compiled and proved, and the greater part of the tables and other data arranged ready for writing the articles on Typhoid Fever and Scarlet Fever for the Annual Report of 1890.

The Proceedings of the Iron Mountain Sanitary Convention have been edited, proof read, and the pamphlet-proceedings received from the printer. The editing of the Proceedings of the Holland Sanitary Convention is well under way.

Distribution of Publications, Etc.

About 800 copies of the Proceedings of the Negaunee Convention, and 800 copies of the Centreville Convention have been sent to persons interested in this State, and to a few sanitarians in other States.

About 100 copies of the Proceedings of the Iron Mountain Convention have been sent to those who took part in that Convention and to other sanitarians.

There were distributed, at the Holland Sanitary Convention, 30 copies of the Report of this Board, for 1889, 20 copies of the Vital Statistics of Michigan for 1888, 150 sets of pamphlets and diagrams on the restriction of dangerous diseases, and 30 copies each of the Conventions held at Battle Creek, Alpena, Charlevoix, Niles, Negaunee and Centreville.

About 800 copies of the invitation and program for the Holland Sanitary Convention were mailed from this Office, and about 400 were distributed at the Convention.

Annual report blanks for reporting diseases dangerous to the public health, and printed envelopes for returning them to this Office, were sent to 1,537 health officers of townships, villages and cities. Similar blanks, together with return envelopes, and blanks for the returns relative to medical practicioners were sent to the clerks of townships, cities and villages.

Records have been kept of names and addresses of those to whom publications have been sent, and of what was sent.

Michigan Complimented.

The last Bulletin of the Tennessee State Board of Health, Jan., 1892, speaking of Michigan, says: "This State, with Massachusetts, may justly claim a leading position in the public-health movement. The people support their State Board of Health" which carries on the work "under the long-continued guidance of one who is perhaps the most eminent sanitary authority in the western world."

"A notable feature in the program of this Board has long been the holding of sanitary conventions from time to time in different parts of the State, small towns not being over looked." Speaking of a recent one, "The proceedings fill a closely printed octavo pamphlet of forty-three pages, and are able papers and discussions of the points in which the parties requesting the convention are directly interested, read and con-

ducted not mainly by the officers and members of the State Board of Health, but quite as much by intelligent and cultivated citizens of Negaunee.

"Michigan, the University State of the Northwest, is no less distinguished as a model for sanitary reform in all that vast region. Tennessee, the University State of the South, should not lag behind Michigan in sanitation. Especially should those cities and towns which are the seat of crowded institutions of learning, patronized by the people of many States, take the lead in this grand field of popular education."

Library Accessions, Etc.

During the first quarter of 1892, three hundred and ninety-two (392) journals (weeklies, monthlies, and semi-monthlies) were received at this office; and seventy-eight (78) books and pamphlets were received and entered on the library accession book. The total number of books and pamphlets (not including volumes of journals not yet bound) contained in the Library, April 11, 1892, was 8,161.

Annual Reports of Local Health Officials.

During the first quarter of 1892, annual reports for the year ending Dec. 31, 1891, have been received and filed from about one-half of the health officers and clerks of townships, cities and villages as follows:

From health officers	801
From clerks	738
Total	1,539

Reports of Medical Practitioners have been received from 351 localities, out of the 1,551 which should have reported, giving the names of 763 physicians in these localities.

Between March 14 and 31 a "second request for annual report" for the year 1891, was sent to 504 health officers and 575 clerks of townships, cities and villages from which no annual report had been received. In response to that request 109 health officers and 151 clerks sent in their annual report before April 1, 1892.

A complete list of all townships, cites and villages in Michigan, arranged in alphabetical order by counties and townships has been made, giving the name and address of every health officer and clerk who has made an annual report to this Board during the quarter, also the localities from which no annual report was received during that time. (Except those from which reports were received from March 14 to 31 inclusive. For want of time those have not yet been entered on the list.)

Typhoid fever in Michigan during the year 1890, has been compiled from the Annual Reports received from health officers and clerks of townships, cities and villages.

Diphtheria for the same year, has been compiled for 25 counties, viz.: From Alcona to Ingham inclusive.

Since March 31, the close of the quarter, a "second request for annual report" has been sent to 319 health officers and 376 clerks from whom no

report had been received for the year 1891. In response to this request, there have been received since March 31, up to this date (April 12, '92), annual reports:—

From health officers	130		
From clerks	118	total	248
Medical Practitioner blanks			46

The whole number of annual reports for the year 1891 received up to this date is			1,787
From health officers	931		
From clerks	856	total	1,787

Whole number of Medical Practitioner blanks returned			397
The whole number of "second requests for annual report" sent out is			1,774
To health officers	823		
To clerks	951	total	1,774

Annual reports received in reponse:—			
From health officers	239		
From clerks	269	total	508

Account of Work on Meteorology during the First Quarter of 1892.

The weekly and monthly summary of meteorological conditions at this Station during this quarter, have been made, and a copy of the monthly summary sent each month, to Edward A. Evans, Director Michigan Weather Service and Local Forecast Official, for his use, who then sends it to the Chief of the Weather Bureau at Washington, D. C.

All of the article on Meteorology for 1890, is compiled and some of it is ready for the printer.

The computations for the tables of meteorological conditions for the year 1891, are finished.

Diagrams in photo-engraving ink, have been made, as follows:

1. Rise and Fall of Sickness and Deaths from Measles in Michigan for each of the years 1877–89, also the curves on same diagram, for average per cent of Reports and Average order of prevalence.

2. Rise and Fall of Sickness and Deaths from Measles (Deaths per 100,000 estimated population) as indicated by per cent of observers and average order of prevalence.

The diagrams Nos. ii. to xii. and Nos. xiv. and xvi., Meteorological Conditions in Michigan for 1890, for the Annual Report of the State Board of Health, have been made and the headings printed.

A table for daily rainfall, at Lansing, Mich., by months, for each of the thirteen years, 1879–91, was made and sent to Prof. T. Russell, office U. S. Weather Bureau, Washington, D. C., at his request, February 26, 1892.

A table of monthly and annual Precipitation (Rainfall and Melted Snow) in Michigan for each of the 14 years, 1877–90, representing the number of Stations each year, was made and sent to F. W. Schwartz, U. S. Engineer, Grand Rapids, Mich., at his request; and also at his request a table of monthly and annual precipitation (Rainfall and Melted Snow)

for each of the 28 years, 1864–91, at the State Agricultural College, near Lansing, Michigan, was made and sent to him.

Report of work in connection with Sickness Statistics, during first quarter of 1892.

During the first quarter of 1892, 2,317 postal cards, 173 record-books, 92 copies of printed circulars, and 12 letters of written instructions have been mailed to 173 health officers, and regular correspondents, 22 letters and 100 circular hektographed letters were mailed to delinquent health officers; 43 copies of the hektographed weekly bulletin, "Health in Michigan," were mailed each week and 100 copies of the hektographed monthly bulletin, "Health in Michigan," have been mailed each month. These bulletins have also been consolidated for this quarterly report.

1,204 weekly card-reports have been received and entered. Work has also been done on the compilation of the weekly reports of sickness, for the Annual Reports.

Health in Michigan in the first quarter of 1892. Communicable Diseases.

Compared with the preceding quarter (October, November and December), reports from all sources show *diphtheria* to have decreased by an average of *twenty-three* places, *scarlet fever* to have increased by an average of *thirty-one* places, *typhoid fever* to have decreased by an average of *seventy-four* places, and *measles* to have increased by an average of *three* places.

Meteorology, and Sickness from all Causes, first quarter of 1892, Compared with the preceding quarter.

A comparison of meteorological conditions of the first quarter of 1892, with the meteorological conditions of the preceding quarter, shows the prevailing wind to have been southeasterly (instead of west), the average velocity to have been twenty-eight per cent less, the temperature to have been much lower, the absolute humidity to have been much less, the relative humidity to have been slightly more, the day ozone to have been less, the night ozone to have been more, the rainfall to have been 1 inch less and the depth of ground above the water in the well at Lansing to have been 2 inches more, in the first quarter of 1892.

Compared with the preceding quarter (October, November and December, 1891), the reports from regular observers show a marked increase of measles, puerperal fever, pneumonia, membranous croup, influenza, cerebro-spinal meningitis, and pleuritis, and a marked decrease of cholera infantum, typho-malarial fever, typhoid fever, cholera morbus, dysentery, remittent fever, intermittent fever, diarrhea, diphtheria, and inflammation of brain.

First Quarter of 1892, compared with the average for the six years, 1886–1891.

A comparison of the meteorological conditions of the first quarter of 1892, with the average for the first quarters in the six years, 1886–1891, shows that in 1892, the temperature was nearly the same, the absolute humidity and relative humidity were slightly less, the day ozone was much less, the night ozone was slightly less, the prevailing wind was easterly (instead of westerly), the velocity was less, the rainfall was .78 of an inch less and the depth of ground above the water in the well at Lansing was twelve inches more than in the corresponding quarters in the six years, 1886–1891.

Compared with the average in the corresponding quarters in the six years, 1886–1891, the reports received from regular observers indicate that cholera infantum, influenza and cholera morbus were more prevalent, and that typho-malarial fever, measles, inflammation of brain, whooping-cough, remittent fever, diphtheria and intermittent fever were less than usually prevalent in the first quarter of 1892.

SYNOPSIS OF THE SECRETARY'S REPORT OF WORK IN THE OFFICE OF THE BOARD, AND OF THE CONDITION OF HEALTH IN MICHIGAN DURING THE QUARTER ENDING JUNE 30, 1892.

Dangerous Communicable Diseases.

The number of reports of outbreaks of dangerous communicable diseases in Michigan, received from all sources and filed, and the corresponding number concerning which action was taken by this office, during the quarter, are as follows: for diphtheria, 140; for scarlet fever, 194; for typhoid and typho-malarial fever, 54; for meales, 63. Total for the five diseases, 451.

Small-pox was reported in two localities during the quarter; one case in the city of Detroit, reported April 25, recovered, no spread of the disease; one case in Green Oak township, Livingston county, reported May 30, died; no spread of the disease. The patient was an immigrant, who landed at Quebec, from a ship which was supposed to be infected with measles.

The number of communications relative to dangerous communicable diseases, received and placed on file during the quarter, was 1,534.

Relative to dangerous communicable diseases, letters, written cards, and demands for weekly or final reports, on cards, or in the form of the circular letter, were sent out during the quarter, to the number of 1,489.

The "Final" reports of outbreaks received and filed during the quarter, were: for diphtheria, 98; scarlet fever, 133; typhoid and typho-malarial fever, 28; measles, 15. Total for the five diseases, 274.

During the quarter, the local columns of newspapers to the number of 3,124 have been looked over for reports of occurrence of communicable diseases. This has resulted in giving this office information of the alleged occurrence of 12 outbreaks of diphtheria, 16 outbreaks of scarlet fever, 11 outbreaks of typhoid and typho-malarial fever, and 7 outbreaks of measles. To what extent the reports of these alleged outbreaks were verified, is shown in the accompanying table.

TABLE 1.—*Showing the number of Outbreaks of Diphtheria, Scarlet fever, Typhoid fever and Measles from April 30 to June 30, 1892, of which notice was received at the office of the Michigan State Board of Health; the per cent of reports, information concerning which was received through the Newspapers; the per cent of newspaper reports which were confirmed by the health officer; the per cent of newspaper reports which were denied by the health officer, and the per cent relative to which no reply was received from the health officer.*

Diseases.	Reports from *all* sources, April 30—June 30, 1892.	Per cent of all reports which were obtained from the newspapers.	Per cent of newspaper reports which were confirmed by the health officer.	Per cent of newspaper reports which were denied by the health officer.	Per cent of newspaper reports to which the health officer made no reply to notice sent from this office.
Diphtheria	140	9	58	8	33
Scarlet fever	194	8	38	13	50
Typhoid fever	54	20	0	45	55
Measles	63	11	43	0	57
Averages for the four diseases		12	35	17	49

Annual Reports of Clerks and Health Officers.

Annual reports were received during the second quarter of 1892 from 347 health officers and 414 clerks.

On May 20, 1892, a "Third Request for Annual Report" for the year 1891 was sent, in a sealed envelope, to each of 942 health officers and clerks from whom no report had been received. From about 700 of these officers no response whatever has been received, possibly, in some cases, owing to changes made at the elections held in March and April.

Of the 1,550 localities in the State, including cities and villages, the whole number of annual reports for the year 1891, received up to June 30, 1892, is: from health officers 1,148, and clerks 1,152.

Of annual reports of health officers and clerks combined, 800 have not yet been received. A large number of the localities from which no report has been received are in the newer counties and recently incorporated villages.

The annual reports received for the year 1891, have been arranged alphabetically by counties and townships ready for compilation.

Reports of Medical Practitioners in their localities, were received during the second quarter, from 93 clerks. The total number of such reports received since Jan. 1, 1892, is 490.

The list of supervisors and clerks for the year 1892, supplied by the Secretary of State, and giving nearly complete returns for 85 counties, has been copied for use in this office.

Return of Health Officers.

Blanks and printed envelopes for the returns of the names and addresses of health officers were sent to 2,493 supervisors of townships, presidents of villages, mayors of cities, and clerks of cities, villages and townships. The returns have been received from 1,028 townships, 229 villages, and 51 cities, and have been placed on file in this office.

Distribution of Publications.

The following pamphlets were sent to the 1,308 health officers of cities, villages and townships whose names were reported to this office, and to the 1,177 clerks, supervisors, or other persons who made a return of the name and address of a health officer: "Work of Health Officers and of Local Boards of Health"; pamphlets on the restriction and prevention of diphtheria, scarlet fever, typhoid fever, typhoid and typho-malarial fever, measles; the leaflet on the restriction of "Dangerous Contagious Diseases"; a blank for recording diseases dangerous to the public health, blanks for final reports, diagrams, and a mimeograph letter relative to a proposed change in the law so that only health officers, instead of health officers and clerks, shall be required to make annual reports to this office.

A copy of the Public Health Laws was sent to each of the 521 *new* health officers, and to 1,177 clerks, supervisors, or other persons who made a return of the health officer.

The reprint from the Annual Report on the Time of the Greatest Prevalence of each disease in Michigan during 1889 was sent to the 134 physicians who made sickness reports to the office.

The reprint from the Annual Report on the Meteorological Conditions in Michigan during the year 1889 was sent to meteorological observers, meteorological exchanges, and to the members of this Board.

About 900 copies of the proceedings of the Iron Mountain sanitary convention were sent to members and ex-members of this Board, secretaries of State Boards of Health, secretaries of State Medical Societies, sanitary journals and other exchanges, meteorological observers and exchanges, members of the State Board of Corrections and Charities, correspondents of this Board, health officers of cities and villages in Michigan, presidents and secretaries of previous sanitary conventions, and health officers, etc., in other states.

Compiling, Editing, etc., for Publication.

During the quarter the reports from health officers and clerks have been compiled, and the articles have been written on the following subjects, for the Annual Report: Glanders, tyrotoxicon, hydrophobia, whooping-cough, epidemic pneumonia, casualties from gasoline, and injuries caused by illuminating oils; work on the article on typhoid fever has been continued; considerable work has been done on the first part of the report, and the indexing has been commenced.

Library Accessions, etc.

During the second quarter of 1892 three hundred and eighty-seven (387) journals (weeklies, monthlies and semi-monthlies) were received at this office; and sixty-eight (68) books and pamphlets were received and entered on the library accession book, making the total number of books and pamphlets (not including volumes of journals not yet bound) contained in the library 8,229.

Work on Meteorology.

The regular tri-daily meteorological observations have been continued at this station, and a summary for each week and month during the quarter has been made, and copies sent to the director of the Michigan State Weather Service and local forecast official at Detroit for his use; he then sends them to the chief of the Weather Bureau, at Washington, D. C.

Meteorological conditions at from 8 to 22 stations in Michigan for 1891 have been tabulated as follows: Average temperature, average daily range of temperature, average absolute humidity, average relative humidity, average per cent of cloudiness, rainfall, average velocity of the wind, average day ozone, average night ozone, average atmospheric pressure, and average daily range of atmospheric pressure. Computations of average temperature, average per cent of cloudiness, direction of wind, average day and night ozone, average daily range of temperature, and rainfall have been made from meteorological registers at from 15 to 21 stations for the first five months of 1892.

Graphic Illustrations, for Study, Publication, or Distribution.

Eight diagrams have been made with photo-engraving ink for purposes of study or for publication by the Board, as follows:—

"Relations of Privies and Wells, Block 36, Holland, Mich."

"Scarlet Fever in Michigan in 1889."

"Low Water in Wells and Sickness from Typhoid Fever in Michigan (11 years, 1878 and 1880–89)."

"Fog and Sickness from Typhoid Fever in Michigan, in 1889."

"Low Water at Lansing and Typhoid Fever in Michigan, in 1889."

"Diseases Restricted by Public-Health Work."

"Map, Distribution of Scarlet Fever in Michigan in 1889."

Diagram, 51x33 inches, on cloth,—"Isolation and Disinfection Restricted Scarlet Fever and Diphtheria in Michigan during the 4 years 1886–89."

Five diagrams have been made with hektograph ink, and copies printed for distribution.

Meteorological instruments have been intrusted to observers during the quarter,—to J. W. Ash, Ashton, Osceola Co., to Lieut. A. H. Boies, Hudson, Michigan, and to W. C. Gates, M. D., Rockland, Michigan.

Work in Connection with Sickness Statistics.

During the second quarter of 1892, 3,612 blank postal cards, 241 record books and 251 copies of printed circulars have been mailed in packages to 241 health officers and regular correspondents; 1,158 weekly report cards have been received and entered; 43 copies of the hektographed weekly bulletin "Health in Michigan," were mailed each week; 100 copies of the monthly bulletin "Health in Michigan," have been hektographed and mailed each month. These bulletins have also been consolidated for the quarterly report. Work has also been done on the compilation of the weekly card reports of sickness during the year 1890 for the annual report.

The Weather and the Health in Michigan in the second quarter of 1892, compared with the average for the six years 1886–1891.

A comparison of the meteorological conditions of the second quarter of 1892, with the average for the second quarters in the six years, 1886–1891, shows that in 1892, the prevailing direction of the wind was the same (southwest), the average velocity was greater, the temperature was slightly lower, the rainfall at Lansing was 1.87 inches more, the absolute, and the relative humidity were slightly more, the day, and the night ozone were considerably less and the depth of ground above the water in the well at Lansing was nine inches more than in the corresponding quarters in the six years 1886–1891. Compared with the average in the corresponding quarters in the six years 1886–1891, the reports received from regular observers indicate that small-pox, diphtheria and scarlet fever were more prevalent, and that measles, typho-malarial fever, intermittent fever, cerebro-spinal meningitis, whooping-cough, remittent fever, consumption of lungs and typhoid fever were less than usually prevalent in the second quarter of 1892.

Cholera.

Relative to the reported presence of cholera in foreign countries, and the possibility of its being brought to this country, Secretary Baker remarked that it would be a particularly unfortunate time if cholera should soon reach Chicago or Detroit, because it tends to spread in much the same ways as typhoid fever, only with much greater rapidity, and typhoid fever is unusually prevalent in Chicago, and appears to have been increasing lately in Detroit. If cholera should gain entrance to either city, so many of our people visit those cities that we might soon find cholera spread in many places throughout Michigan. This office is prepared to issue circulars, already printed, advising local health officers just how to restrict cholera.

Contagious Diseases Brought in by Immigrants.

The Secretary presented the subject of infected immigrants, and, to illustrate a point, read a letter from a township health officer, stating that he had found, isolated and vaccinated, the person of whom he was notified as possibly infected with small-pox, also reporting his action concerning one of the immigrants, of whom he had received notice, who had come down with measles. The expense incident to these cases was about $17. He thought the national government might go a step further and detain at the seaboard those immigrants likely to be infected.

Sanitary Subjects at the Meeting of the American Medical Association in Detroit, June 7–11, 1892. Report of Attendance by Delegates.

Dr. Hazlewood reported verbally that "The notable features of the meeting of the American Medical Association in Detroit, were the large attendance, the good accomodations for the meetings of sections as well as for the general meetings; the meetings for work of the sections morning

and afternoon, and the prominence given to subjects having a bearing upon preventive medicine, not confined to the section on State Medicine. The section on Diseases of Children virtually gave up two morning sessions to a discussion of the prevention of diphtheria and scarlet fever. Dr. Duffield there explained the difficulties incident to carrying out any plan of isolation in the homes of the poor, when the family had no spare room, and the mother was unaided in any of her domestic duties, and often only tenants of premises occupied in part by other families equally restricted in space or assistants. Dr. Duffield outlined a scheme for Cottage Hospitals which he had presented to the Common Council, in which provision would be made for the removal of all cases of contagious disease, together with the mother of the child, where all precaution could be taken and the patient would be better placed than in any ordinary home.

"With so many sections holding sessions at the same time it was impossible to get in to all that was of interest to the sanitarian. At the afternoon session on Wednesday of the State Medical section, Dr. Bell of Brooklyn read an interesting article advocating a National Bureau of Health in which he cited some of his own experiences and the good results from steaming the holds of vessels that have been infected with yellow fever. Dr. Harvey Reed advocated more inspection of the slaughter houses, and meat there prepared for food, and asked for a committee. Dr. Gihon protested that the U. S. government inspection was complete and asked how the committee were to be compensated. Dr. Reed answered that the expense was not to be considered; that a committee could be formed of members, residents near the large slaughter houses, and he thought good would come of it. On his representation the appointment of such a committee was approved by a vote of 13 to 5. The number in attendance was an evidence also of the interest in this section.

"Thursday afternoon the section on State Medicine was not quite so well attended. The sanitary side of the drinking question was presented, and the view that the habit should be considered as a disease was emphasized. Dr. Bell cited a case of his own experience on board ship, where a youthful sailor was whipped for drunkenness with good effect. The general opinion as expressed however was, that the confirmed drinker should be treated as an insane person and protected in a hospital.

"The river excursion cut short the arguments, and the section adjourned after electing Dr. Charles A. Lindsley, of Conn., chairman, and Dr. S. P. Duffield, of Detroit, secretary.

"Friday morning several of the sections either failed to meet or had already adjourned so that I found nothing of special importance in a sanitary point of view, until the hour for the general session which closed with the masterly address on State Medicine by Dr. J. Berrien Lindsley, of Tenn., which finished the work of the Association, for which I can only refer you to the published copy in the Journal of the Association."

Dr. Mason W. Gray reported verbally as a delegate to the meeting of the American Medical Association: The section on preventive medicine was largely attended; and public-health work was given a prominent part in the meeting of the association. Dr. Hazlewood neglected to state that, in the section on State Medicine, he and Dr. Vaughan took prominent part in the discussion of the contagiousness of scarlet fever. An interesting fact was mentioned by Dr. Brush, from Mt. Pleasant, N. Y., that the source of contagion in a case of scarlet fever had been traced to

clothing infected with scarlet fever which had been opened after being packed away for thirty-five years. Dr. J. Berrien Lindsley of Tennessee, gave a very fine address on State Medicine, and Dr. Gihon, in his address on the Practice of Medicine, gave much of interest to the sanitarian. I was agreeably surprised to see that preventive medicine took such a prominent part in the association, and in the discussions in the several sections, and that the subject is being given more and more prominence in the affairs of medical men.

A Sanitary Day.

Dr. Hazlewood brought up the subject of a "Sanitary Day," concerning which, since the last meeting, there has been correspondence with members of this Board by the Secretary. Dr. Hazlewood thought that the subject was worthy of action, and that it should be brought into public notice as soon as practicable. The subject was discussed by the members present. The health interests suffer because they are not supported by the people; it is believed that they would be properly supported if facts were carefully put before the people every year at a sanitary meeting similar to the school meeting in September.

The origin and nature of the movement may be learned from what here follows:—

Dr. Joseph F. Edwards, chairman of a special committee of the Pennsylvania State Board of Health on this subject, wrote to the Secretary of the Michigan Board, stating that, "It has been suggested to our board by the mayor of one of our cities, that we should recommend to our legislature the setting apart of two days annually, one in the Spring, the other in the Fall, to be known as 'Sanitary Days;' these days to be devoted, in an especial manner, to domestic and municipal 'cleaning up,'" * * * "As we have Labor, Arbor and Independence days, with their appropriate celebrations, so might we also have Sanitary Days, on which, in each town and village special instruction in hygiene might be given to the people."

The Secretary of the Michigan Board replied:

"DEAR DOCTOR—Replying to your letter of June 18, I think the suggestion for a 'Sanitary Day' to be devoted to public health subjects a very important suggestion. * * *

"However, cleanliness and 'cleaning up' are of minor importance, compared with the restriction and prevention of the dangerous communicable diseases; these are the diseases *which cause most deaths* in Pennsylvania, as in Michigan. I enclose a diagram showing the five diseases which cause most deaths in Michigan. You will see that only one of the five (typhoid fever) is due to filth, and can be very much restricted by ordinary cleanliness.

"Four of the five diseases which cause most deaths in Michigan are increased during or following the cold weather; and the remaining one, typhoid fever, reaches its highest point in October. I think the Sanitary day should be in the autumn.

"In reply to your request for suggestion for the proper observance of the day, I send you, by this mail, a copy of the Journal of the American Medical Association, of May 21, 1892, on the first two pages of which is an article by myself on this subject, proposing the setting apart by law of a day in each year on which to present locally to the people of every township, city and village, the facts and reasons why expenditures for public-health work are in the public interests; the purpose being the appropriation of money for public-health work. But there would be very much besides the appropriation of money, to be gained through such a systematic presentation of sanitary affairs throughout the country on such a day set apart in each year.

"I agree with you that spasmodic action on one or two days in a year is not enough; but, if proper

work is done on this one day proposed, I think it would be one of the most important measures for the advancement of public health that has ever been proposed in this country. I wish the movement great success.

Very respectfully,

HENRY B. BAKER, *Secretary.*

The article referred to in the foregoing letter was the annual oration on general medicine before the Michigan State Medical Society, in May, 1892. It is as follows:

THE WORK AND PAY OF HEALTH OFFICERS.

(Published by permission of the Michigan State Medical Society.)

BY HENRY B. BAKER, M. D., OF LANSING, MICH.

Mr. President and Members of the State Medical Society:—I wish, first of all, to thank the section of Practice of Medicine for this opportunity to place before you what I have to offer. I have assumed that I would be expected to deal with some subject likely to be of interest to the general practitioners, and which my own occupation might enable me to have more than ordinary opportunities for studying. Inasmuch as the State law now requires that, wherever it is practicable, every health officer shall be a physician, and there are now fifteen hundred health officers chosen in Michigan every year, there is a possibility of my subject being of interest to a considerable proportion of the general practitioners in the State, because many of them may, at some time, be health officers, and because, if my views were to be carried out, nearly fifteen hundred practitioners would devote the greater part of their energies to official duties, and not to the practice of medicine.

Although the title of this address is "The Work and Pay of Health Officers," I desire, at this time, to deal especially with the subject of pay. My belief is that the compensation of the health officers, generally throughout the State, with only a few exceptions, is ridiculously small and inadequate; and that the best interests of all concerned are injured thereby, and will be best conserved by such a general change as shall recognize the fact, as old as the scriptures, that "the laborer is worthy of his hire" or reward.[1] I suppose it is not necessary for me to laboriously prove that this proposed change would be a good thing for the medical profession in this State; if it is ever questioned I will try to prove it, on some other occasion; but it may not, at first glance, be so apparent that it would be a good thing for the sanitary interests of the whole people of the State. Therefore the reasons for a belief that such is the fact may well be stated.

At first thought, it might seem that gratuitous services by physicians acting as health officers would always be for the best interests of the people generally; and, in the beginning of any movement for sanitary reform, it undoubtedly is for the best interests of the people. The people of Michigan owe a great debt of gratitude to the philanthropic physicians throughout this State who have generously performed services for the public which the people generally were not sufficiently informed to ask for, to pay for, or to appreciate, but which have tended to place Michigan in

[1] 1 Timothy, v. 18, and Luke x. 7.

the front rank of progress in sanitary reform. The officers and members of this State Medical Society, especially, have contributed very greatly to place Michigan in the lead in sanitary progress.

But, in the evolution of organized society, there come times when methods, which have served exceedingly useful purposes, need to undergo slight modification in order better to fit them for the changed conditions. In my opinion, the time has arrived when it will best serve the people of Michigan to gradually educate them into a knowledge of the real value of public-health work, and into an appreciation of the fact that it is best for corporations and governments, townships, cities and villages, as it has long been known to be best for individuals, not to try to get something for nothing. In the long run, an effort to get something for nothing is unsuccessful. Such efforts generally lead the individual to the penitentiary, and the government to a penitential mood.

The people have gradually so increased their appreciation of the importance of public-health work that their representatives, the law-makers, have provided so much work to be done by health officers, and have affixed to the non-performance of the duties such penalties that no ordinary practitioner can without adequate compensation afford to take the chances of being held accountable under the law for the neglect of official duty. But the main reason why it does not seem to be best that the duties of the health officer should generally be performed gratuitously, is that no ordinary practitioner can afford to, and it is getting so that generally no competent physician will, for any small sum neglect his practice and do all that the law and public sentiment now expect to be done by the health officer.

The amount of service that is now required of the health officer is frequently not appreciated by the physician until he has accepted the office, when he finds that, owing to comparatively recent laws, more is required of him than he anticipated.

What is needed is some method whereby not only physicians, but the people generally, who have to pay the health officer, shall become informed of the nature, extent, and importance of the work of the health officer. It seems to me that, as might have been expected from the occupation, those who have managed the school interests in Michigan have shown most wisdom in their methods of impressing the people with the importance of their work, and also in obtaining from the people the necessary money to carry on the school work. We need to adopt their methods. Whoever will examine his receipt for taxes will find that the main items are for school purposes. Yet the people vote to assess themselves for those purposes, after the subject has been carefully put before them. And those who have the interests of the schools in charge have opportunity, and they carefully prepare and put before the people every year, at the school meeting in September, the amounts of money which it is estimated should be used for school purposes, and facts and reasons why those amounts are needed. There should be a law similar to the school law, relative to public-health affairs. Surely the interests of the health and life of the whole people, including the children, are of more consequence than the school education of the children alone!

All that is required to make this apparent, is such an opportunity as the school laws provide for placing the facts before the people at the time the vote is taken to adopt the estimates of those who have this branch of the public service in charge.

How to get Money for Public Health Work.—Have a public meeting of citizens of the city, village or township, at which meeting the amount of money to be assessed and collected for public-health purposes shall be voted upon. Have the local board of health present to that meeting estimates of the amounts proper to be collected. The health officer should be prepared, and should present to this public meeting the facts, and reasons why expenditures for public-health work are in the public interests. It ought not to be difficult to convince the people generally that the lives and health of the people themselves are of more consequence than any other subject for which they collect taxes.

Let us suppose that opportunity is given the health officer to put before the people of a township, village or city the facts and reasons for public-health work; what can be presented? This can be presented:—

1. The health officer can assure the people that, if they are situated in the average locality in Michigan, the death-rate will average about 17 per thousand inhabitants per year; that, of those deaths, about 11.8 per cent, will be from consumption, 6.5 from diphtheria, 2.7 from scarlet fever, and 3.2 from typhoid fever. He can assure the people that these are all communicable diseases, that they are all preventable through measures which are now well known to sanitarians; and, what is more to the point, he can assure them that reliable statistics, collected by the Michigan State Board of Health, from the experience of local officers in Michigan, have proved that (even after the disease has been introduced) about 75 or 80 per cent of the cases and deaths which would have occurred from diphtheria and from scarlet fever are prevented by measures which a good health officer, acting in accordance with our present laws, and supported by the people of his locality, can inaugurate and maintain. Knowing approximately the population of the township, village or city, the health officer can readily compute the saving of life which such a saving, as has been proved to occur under such measures, would be for that number of inhabitants. Let us suppose a small city, of four thousand inhabitants—then the deaths from all causes, at the rate of 17 per thousand per year, would be 68; the deaths from consumption (11.8 per cent.) would be 8; the deaths from diphtheria (6.5 per cent.) would be about 4½ (4.4); the deaths from scarlet fever (2.7 per cent.) would be nearly two (1.8); the deaths from typhoid fever (3.2 per cent.) would be a little over two. If 75 per cent of these deaths were to be prevented, there would be a saving of the lives of about three persons from death by diphtheria, about one from scarlet fever, and one from typhoid fever. These five persons constitute a part of the productive energy of the city upon which its prosperity depends. They are worth to the city, for what has been expended to raise them, and for what they will earn in excess of costs of maintenance, at least as much each as a good slave would sell for before the war, which was about the same as the statisticians compute as the value of an ordinary laborer—say for the adult person one thousand dollars, and for each of the children one-half of that amount. The four who are saved from diphtheria and scarlet fever would be likely to be children, while the one saved from typhoid fever would be likely to be in the prime of life. The actual money value of the five persons, therefore, would be three thousand dollars. If a city of four thousand inhabitants should vote to use three thousand dollars per year in public-health work, I have no doubt whatever but the five lives, above mentioned, could be saved, from those three diseases alone; and

probably lives could be saved from other diseases. Then how much better to save those lives, and avoid the grief and sorrow which would result from their loss. Again, the money used would be only the amount which, without effort for restriction, would be lost to the city—the actual outlay would not be at all increased. It seems to me that any meeting of citizens, of ordinary intelligence, could be made to see that the lack of public health work is a wasteful extravagance, and that it is better to use a certain sum of money to pay a health officer than to permit the death of loved ones that have actually cost as much as that sum, and who, if they die, are a dead loss, in more than one sense.

These facts are applicable to every locality in Michigan, making allowance for a greater or less number of Inhabitants. * * * * *

I have given you some of the reasons why I favor legal provision for the presentation locally, to all voters throughout the State, of the benefits to be expected from sanitary work, after the manner of the meetings to determine the amounts of money to be raised for school purposes.

SUMMARY RELATIVE TO THE YEAR ENDING DEC. 31, 1891.

Dangerous Communicable Diseases.

The numbers of reported outbreaks of dangerous communicable diseases in Michigan, reports of which were received from all sources, and filed, and the corresponding numbers concerning which action was taken by the Office of the State Board of Health, during the year 1891, are as follows: Of diphtheria, 554; of scarlet fever, 588; of typhoid and typho-malarial fever, 427; of measles, 317; of small-pox, 3. Total of the six diseases, 1,889. In about one hundred of these reported outbreaks, investigation proved that it was a false report.

The number of communications relative to dangerous communicable diseases, received and placed on file during the year, was 5,434.

Relative to dangerous communicable diseases, letters, written cards, and demands for weekly or final reports, on cards, or in the form of the circular letter, were sent out during the year, to the number of 5,635.

During the year, the local columns of 9,165 newspapers have been looked over for reports of occurrence of communicable diseases. This has resulted in giving this office information of the alleged occurrence of 79 outbreaks of diphtheria, 79 outbreaks of scarlet fever, 113 outbreaks of typhoid and typho-malarial fever, 68 outbreaks of measles, and one outbreak of small-pox. The alleged outbreak of small-pox was verified. To what extent the reports of these alleged outbreaks for the other five diseases were verified during the year, is shown in the accompanying table.

TABLE 1.—*Showing the number of Outbreaks of Diphtheria, Scarlet fever, Typhoid fever and Measles, from Jan. 1 to Dec. 31, 1891, of which notice was received at the office of the Michigan State Board of Health; the per cent of reports, information concerning which was received through the Newspapers; the per cent of newspaper reports which were confirmed by the health officer; the per cent of newspaper reports which were denied by the health officer, and the per cent to which no reply was received from the health officer.*

Diseases.	Reports from *all* sources, Jan. 1—Dec. 31, 1891.	Per cent of all reports which were obtained from the newspapers.	Per cent of newspaper reports which were confirmed by the health officer.	Per cent of newspaper reports which were denied by the health officer.	Per cent of newspaper reports to which the health officer made no reply to notice sent from this office.
Diphtheria	554	14	43	29	28
Scarlet fever	588	13	41	19	41
Typhoid fever	427	26	41	34	24
Measles	317	21	53	13	34
Averages for the four Diseases		19	45	24	32

GENERAL REPORT OF WORK IN THE OFFICE OF THE SECRETARY OF THE STATE BOARD OF HEALTH DURING THE FISCAL YEAR ENDING JUNE 30, 1892.

Much of the work of the office naturally groups itself under three closely related heads,—the collection of information, the compilation and elaboration of information, and the dissemination of information. In the following outline that grouping is adhered to so far as is practicable without repetition.

COLLECTION AND COMPILATION OF INFORMATION.

RETURNS OF NAMES AND POSTOFFICE ADDRESSES OF HEALTH OFFICERS.

There is a local board of health in every township, and in every incorporated city and village in Michigan.

Every local board of health in Michigan is required by law to appoint and constantly have a health officer, and to report his name and address to the Secretary of the State Board of Health at Lansing.

Blanks for the return of the names and addresses of health officers are sent out by the Secretary of the State Board of Health to the local officers about the first day of April, the law (§1634 Howell's Statutes) requiring the appointment and return to be made "within thirty days after the annual township meeting in each year."

In the Secretary's quarterly report of work during the third quarter of 1891, printed on a preceding page of this volume, is an account of the

collection of this information relative to the health officers in Michigan in 1891–2.

In April, 1892, the usual demand was made upon supervisors of townships, presidents and clerks of villages, and mayors and clerks of cities, for returns of the names and postoffice addresses of health officers to serve in 1892–3. The circular and blank forms used are similar to those printed on pages xiii–xiv of the Report for 1884. In June, 1892, a second demand was sent to localities from which no return had been made in response to the demand in April. On the outbreak of a dangerous communicable disease in a township, city or village in which no health officer has been reported, a third, and even a fourth demand for the appointment of such officer, and the return of his name, is generally made.

Through the systems of reports to the State Board of Health by its corps of correspondents, as well as by the local health officers, and by a systematic searching of the local columns of the country newspapers published in Michigan, the Secretary of the State Board often receives information of an outbreak of a communicable disease, and desires to communicate at once with the health officer; but if no health officer has been appointed in that locality, or no return of such appointment has been made, delays occur, and before the Secretary of the State Board can get into correspondence with the delinquent local board and a health officer can be chosen, the disease may spread widely within or without the limits of the vilage or township, with unnecessary sickness and loss of life.

It should be said that there is an increasing tendency to comply with this law, and local boards now generally act promptly and coöperate cordially with the State Board of Health in its endeavors to prevent the spread of dangerous communicable diseases.

SPECIAL REPORTS RELATIVE TO DANGEROUS COMMUNICABLE DISEASES.

Every health officer is supplied with blanks "L" from this office, for reporting outbreaks of diphtheria, typhoid fever, scarlet fever, small-pox, measles, etc., (dangerous communicable diseases) to the Secretary of the State Board of Health, as required by law.

Upon the receipt of the report of an outbreak of such disease, blanks "M" for weekly reports during the outbreak, are sent, with a circular letter ("Blue Letter"), also a number of pamphlets containing instructions for the suppression of the disease. These pamphlets are to be distributed to the neighbors of the family in which the disease is, in order to obtain their coöperation with the health officer.

About 1,669 outbreaks of such diseases were thus attended to during the fiscal year ending June 30, 1892.

Later a blank is sent to each such locality for a final report at the close of the outbreak, stating just what was done for the restriction of the disease, and with what result,—the number of cases and deaths, households invaded, what disinfectants were used, in what quantities, and other facts supplying important data for future efforts.

The facts thus collected are compiled for publication in the Annual Report of the Secretary of the State Board of Health. In this Annual Report will be found the report of such facts relative to the dangerous communicable diseases in Michigan during the year 1891. The article begins on page 145.

SICKNESS STATISTICS; WEEKLY POSTAL-CARD REPORTS OF ALL IMPORTANT DISEASES IN 1891-92.

The weekly postal-card reports of diseases, sent on cards furnished by the State Board of health, have been received from health officers of cities and villages and other leading physicians, who contribute this valuable information from different parts of the State. The plan of these weekly card-reports is stated on pages 80 and 81 of this Report; on page 81 is an example of these reports properly filled out. When a report of a new health officer of a city or village is received, a printed letter is sent (if health officer of a village it is number [149], if of a city a similar letter is sent) with a circular [129] describing the plan of the reports, and transmitting supplies for making them.

A list of observers of diseases for the calendar year 1891 and a compilation of their reports, with a study of relations of sickness to climatic conditions is printed in this Report, pages 79–144. The sickness statistics of Michigan, based upon these weekly reports by the leading physicians in the State, are probably the most important sickness statistics in the world. They are also made especially useful for the purpose of studying the causation of diseases, by reason of the excellent system of meteorological statistics which have now been collected during such a long series of years as to make them exceedingly useful for such combinations.

ANNUAL REPORTS BY HEALTH OFFICERS FOR THE YEAR ENDING DEC. 31, 1891.

In December, 1891, a circular [164,] was sent to the health officer of each township, city and village in the State, about 1,600 in all, transmitting a blank form [I] for use in making his annual report to this office. This circular was substantially the same as circular (65), which is printed on pages viii–ix of the Report for 1884. Blank form [I], for reports of health officers, is printed in former Reports. With the circular [164] was also transmitted a blank for a copy of a record of diseases dangerous to the public health, similar to the blank which is printed, reduced in size, on page 271 of the Report for 1882.

Where the name of the health officer had not been returned to this office, the blanks were sent to the president of the village, the mayor of the city, or the supervisor of the township, according as the vacancy occurred in a village, city, or township.

ANNUAL REPORTS BY CLERKS OF LOCAL BOARDS OF HEALTH FOR THE YEAR ENDING DEC. 31, 1891.

At the same time (December, 1891,) that the circulars and blank forms were sent to the health officers, a circular [165] asking for a report, and a blank form [J] on which to make a report, were sent to the clerk of the local board of health of each township, city and village in the State, about 1,600 in all. A blank form for a copy of his record of cases of diseases dangerous to the public health was also sent; the circular and blank form sent to the clerk were similar to those sent to the health officer, except that they were not so explicit in questions relating to sickness and deaths.

RETURN OF NAMES OF MEDICAL PRACTITIONERS.

About January 1, 1892, blanks for the return of names of Medical Practitioners were sent to each of the clerks of the townships, cities and vil-

lages, about 1,600 in number. An example of these blanks is printed on page xi of the Report of the Board for 1888.

METEOROLOGICAL REPORTS.

A list of meteorological observers for the calendar year 1891, with a statement of what registers were received from each, is printed in this Report. The reports are summarized in an article in this Report on the Principal Meteorological Conditions in Michigan in the year 1891, pages 1–78. The data are or great value for the purposes of studying the causes of diseases. The observations made at the office of the Board, at Lansing, have been summarized weekly, and a copy kept on file in the office.

DISSEMINATION OF INFORMATION.

PUBLISHED LIST OF NAMES AND ADDRESSES OF HEALTH OFFICERS.

The names and addresses of 1,388 health officers in Michigan were printed in August, 1891, and a copy of the pamphlet sent to each health officer in Michigan, in order to facilitate his ready notification, to the health officer of any locality in this State, concerning the possible spread of any dangerous communicable disease; also to facilitate correspondence on any of the numerous questions with which health officers have to deal. The pamphlet was also sent to each of the delinquent boards of health, in the hope that, on seeing the blank where there should be the name of a health officer they would then comply with the law which requires the appointment of a health officer and the return of his name. In some instances that was the result. The pamphlet has also been useful, in the Office of the Secretary of the State Board, for several other purposes.

DISTRIBUTION OF INFORMATION HOW TO RESTRICT AND PREVENT DANGEROUS DISEASES.

Whenever information is received of the occurrence of diphtheria, scarlet fever, measles, small-pox, typhoid fever, or typho-malarial fever, copies of a document on the restriction and prevention of the disease reported are immediately sent to the health officer, with a request that he distribute them where they will be likely to be read, and it is suggested that the neighbors of those families in which the sickness occurs would be most likely to read them at such times of danger; and it is thought that after reading them they will be most likely to co-operate with the local health officer for the restriction of the diseases. Thousands of pamphlets on each of the most dangerous communicable diseases are distributed by the State Board in this manner—in localities where the disease treated of in the pamphlet is present. They are being distributed in this way all the time, because there is no time when the State is free from scarlet fever or diphtheria, these being among the most important of the dangerous communicable diseases in Michigan. Copies of the documents on diphtheria, scarlet fever, and small-pox, in German or in Dutch, are also sent when it is thought they can be used to advantage. Owing to frequent requests for documents in French, Polish, Swedish, and Danish-Norwegian, translations of a leaflet on contagious diseases [47.] have been made into each of these languages; and copies are sent to local boards when so requested.

A record is kept of reports received and of correspondence relative to each outbreak of a dangerous communicable disease of which the office receives information. A compilation of such information relative to several of the most important diseases is published in this volume.

PRINTING AND DISTRIBUTION OF THE SECRETARY'S ANNUAL REPORT.

Comparatively few of the Annual Reports of the Secretary are published. The whole number published is not as large as the whole number of officers and members of local boards of health in Michigan. Only about six thousand copies of the Reports are published for all purposes. A little over half of these (3,500 copies) are at the disposal of the State Board of Health. These reports are used to exchange with sanitary journals, with other State Boards of Health, with boards of health in other cities and countries, with State and Sanitary libraries, and to supply physicians in Michigan who contribute to the work of the Board. Michigan is a great and prosperous State, and it is believed that it is made richer, not poorer, by the influences exerted by the publications of the Michigan State Board of Health.

PRINTING AND PUBLISHING PAMPHLETS, LEAFLETS, AND DIAGRAMS OF INFORMATION.

In March, 1890 the following slip "Recent Saving of Life in Michigan" was reprinted from page 73 of the Proceedings of the Vicksburg Sanitary Convention, which was a paragraph from a paper prepared by the Secretary of this Board. Since then a number of editions of the slip have been printed and distributed. The edition which has been distributed during the fiscal year ending June 30, 1892, was printed just prior to the beginning of the fiscal year and was as follows:

RECENT SAVING OF LIFE IN MICHIGAN.

In a carefully-prepared paper, read before the Sanitary Convention at Vicksburg, the proceedings of which are published, Dr. Baker gave official statistics and evidence which he summarized as follows:—

"The record of the great saving of human life and health in Michigan in recent years is one to which, it seems to me, the State and local boards of health in Michigan can justly 'point with pride.' It is a record of the saving of over one hundred lives per year from small-pox, four hundred lives per year saved from death by scarlet fever, and nearly six hundred lives per year saved from death by diphtheria—an aggregate of eleven hundred lives per year, or three lives per day saved from these three diseases! This is a record which we ask to have examined, and which we are willing to have compared with that of the man who 'made two blades of grass grow where only one grew before.'"

In July, 1891, the two-page leaflet [173.] relative to "Dangerous Contagious Diseases" was revised and reprinted to the number of 10,000

copies, for distribution. It is reproduced here immediately following this article. It is on pages xcv–xcvii.

In August, 1891, 1,000 copies of the diagramatic leaflet "Chart I." and "Chart II.," showing the relation of typhoid fever to sewerage and water supply, in cities of this and other countries, were reprinted for distribution.

In September, 1891, 1,000 copies were printed of the two-page leaflet entitled "Deaths in Michigan, 1876–87," exhibiting graphically the relative mortality from each of the several most important causes of deaths, and on the other side of the sheet a diagram showing the "Pathogenic Micro-Organisms, 'Germs' of Disease." In January, 1892, this leaflet was again reprinted to the number of 2,000 copies; and, in April, 1892, 2,000 copies more were printed.

In September, 1891, 10,000 copies of the pamphlet No. [110.] "The Restriction and Prevention of Scarlet Fever" were reprinted for distribution.

In September, 1891, 10,000 copies of the pamphlet No. [106.] "The Restriction and Prevention of Diphtheria," were printed for distribution, by the method explained on a preceding page.

In September, 1891, the pamphlet on "The Restriction and Prevention of Consumption" No. [175.], was printed to the number of 5,000 copies.

In September, 1891, the pamphlet on "The Restriction and Prevention of Measles" was reprinted to the number of 5,000 copies, and widely distributed. In May, 1892, the pamphlet was again reprinted to the number of 10,000 copies.

In October, 1891, the leaflet with "Typhoid Fever, Sewers, and Water Supply in Munich" on one side, and the diagram "Low Water in Wells and Sickness from Typhoid Fever in Michigan" on the other side, were printed to the number of 10,000 copies and widely distributed where they would be likely to be of interest. In April, 1892, this leaflet was again reprinted to the number of 3,000 copies.

A sixteen-page pamphlet No. [120.] "Work of Health Officer and Local Boards of Health" was reprinted in February, 1892, to the number of 6,000 copies. Copies of this pamphlet were distributed to health officers, and to members of local boards of health, and to other persons who needed to know the duties of such officers, and the laws relative thereto.

In April, 1892, pamphlet No. [124.] "The Prevention of Typhoid Fever," was printed to the number of 10,000 copies, for distribution to localities from which the disease was reported present.

In April, 1892, 3,000 copies of the diagram, "Isolation and Disinfection Restricted Scarlet Fever, in Michigan in 1888," were printed and have since been widely distributed.

As fast as the names and addresses of health officers for 1892 were received, a copy of the pamphlet, No. [120.] detailing the duties of health officers, was sent to each, together with blanks [L.] for the prompt report of dangerous communicable diseases, and sample copies of the pamphlets on the restriction and prevention of diphtheria, scarlet fever, typhoid fever, typho-malarial fever, measles, consumption and small-pox, a pamphlet reprint on the "Restriction and Prevention of the Dangerous Communicable Diseases," and a copy of each of two leaflet diagrams, one exhibiting the experience in Michigan in 1888 in restricting scarlet fever, the other exhibiting the experience in restricting diphtheria in 1887, also the laws relating to Public Health, in force in Michigan in 1890.

HEALTH BULLETINS, WEEKLY AND MONTHLY, AND QUARTERLY REPORTS.

The weekly reports of diseases received up to Wednesday of the week following the week for which they are made, are compiled on that day, week by week, and a bulletin, based on that compilation, is sent for publication to a number of newspapers, and to sanitary and medical journals. A telegraphic abstract from the compilation is also sent weekly to a Michigan Press Association. A specimen of this weekly health bulletin can be found on page xii. of the Report for 1884.

This subject of dissemination of information by means of bulletins is treated of in the article on "Time of Greatest Prevalence of each Disease," in this same volume, page 82.

Beginning with the month of August, 1884, a *monthly* health bulletin has been issued immediately after the close of each month, for the use of sanitary and medical journals. Beginning with the bulletin for the month of September, 1889, a third column was added, being the average for the bulletin month in the preceding series of years, beginning with the year 1886. This enables the reader to make a comparison of the prevalence of each disease in the last preceding month with the same disease in the corresponding month in the preceding series of years. An example of this form of bulletin is printed on pages xlv–xlvi. of the Report for 1890.

At the close of each quarter these monthly bulletins are consolidated for the Secretary's "Quarterly Report of work in the Office," comparing the increase or decrease of communicable diseases with the preceding quarter; including also the meteorological conditions and the sickness from all causes compared with the preceding quarter, and with the average for corresponding quarters for the series of years beginning with 1886.

Beginning with January, 1890, and ending with February, 1891, a supplementary bulletin was prepared representing graphically the relative amount of sickness from each of the principal diseases in the month for which the bulletin was issued. This was sent with the regular monthly bulletin for the same month. A sample of this graphic bulletin is printed on page xlvii of the Report for 1890, and one is printed on page 85 of the Report for 1891.

DIAGRAMS OF INSTRUCTIVE EXPERIENCE IN MICHIGAN.

Two diagrams, "Isolation and Disinfection Restrict Diphtheria," and "Isolation and Disinfection Restrict Scarlet Fever," have been printed and many hundreds of them distributed as heretofore mentioned. They exhibit, in a condensed form, the experience of the health officers in Michigan, with these two important diseases, relative to scarlet fever in 1888, and diphtheria in 1889. The evidence in them is similar to that in similar diagrams which have been published for other years; therefore the evidence gains greatly in strength.

ABSTRACTS OF PROCEEDINGS OF MEETINGS OF THE STATE BOARD.

Abstracts and brief accounts of the proceedings at meetings of the State Board of Health are prepared, printed, and distributed soon after the regular meetings of the Board. (Extracts from these abstracts are printed on preceding pages in this Report.) The distribution of the pamphlet Proceedings is not the same for all meetings, being to different classes of

persons, according to the nature of the contents, in some instances being sent to teachers and school officers, in other instances to health officers, etc.

SECRETARY'S QUARTERLY REPORTS OF WORK IN THE OFFICE.

At the close of each quarter the Secretary prepares a brief report of work done in the Office. This report is presented and generally read at the next regular or special meeting; and, if the Abstract of proceedings of the meeting is printed, the report is printed in the pamphlet.

REPRINTS.

Reprints, of articles in the Report and in Proceedings of Sanitary Conventions, have been made in pamphlet form, and sent in answer to queries, in letters, that can best be answered in that manner. For example, many reprints of the article relative to alleged nuisances in the preceding year, have been thus sent out, in response to questions.

The two-page leaflet referred to on pages xcii–xciii, is here reproduced, in the same type, as follows:

DANGEROUS CONTAGIOUS DISEASES.

LEAFLET ISSUED BY THE MICHIGAN STATE BOARD OF HEALTH.

[173.] [Revised Edition, 1891; 10.000 printed.]

In Michigan, diphtheria and scarlet fever are the most dangerous *contagious* diseases, as that term is usually understood; the most dangerous *communicable* diseases, named in the order of their importance as causes of deaths, are consumption, diphtheria, pneumonia, typhoid fever, scarlet fever, whooping-cough, measles and small-pox.

Consumption is now known to be a communicable disease, therefore some of the following general rules are applicable for its prevention and restriction. The most important measure for the restriction of consumption is the disinfection or destruction of all sputa of every consumptive person.

Typhoid fever. Unlike typhus fever, typhoid fever is not often contracted directly from the sick person, but from the discharges from the bowels of the sick person; these should always be disinfected. The chief source of danger is believed to be drinking water contaminated by leaching from privies, etc. All suspected water should be boiled.

Cholera. The same precautions recommended to prevent the spreading of typhoid fever should be taken as soon as cholera appears. The first evacuations of choleraic diarrhea are infectious, and should, as well as all that follow, be immediately carefully disinfected.

Whooping-cough is a communicable disease which, in Michigan, causes more deaths than does small-pox. Most of the following rules, except perhaps those for disinfection of the discharges from the kidneys and bowels, are applicable for its prevention and restriction.

Small-pox. The following rules are applicable for the restriction of small-pox whenever the disease occurs, but by vaccination and re-vaccination small-pox may be and should be almost wholly prevented.

General Rules for the Prevention and Restriction of Scarlet Fever, Diphtheria, Small-pox, and Typhus Fever.

1. **Avoid** the contagium or special cause of the disease. Unless you are needed to care for the sick, or are protected by having had the disease, or in case of small-pox by thorough vaccination, do not go near the sick person. Do not allow your lips to touch any food, cup, spoon, or anything else that the sick person has touched or that has been in the sick room. Do not wipe your face or hands with any cloth that has been near the sick person. Do not wear any clothing that the sick person has worn, during, just before, or just after his sickness. Keep your hands free from discharges from the body or skin of the sick person. Do not touch him with sore or scratched hands. Particularly avoid inhaling or in any way receiving into the mouth or nose the branny scales that fall or peel from one recovering from, or apparently wholly recovered from scarlet fever.

2. **Restrict** the contagium or special cause of the disease. Isolate the sick. Separate those sick with any of these diseases, even if they are but mildly sick, from all persons except necessary attendants. A person sick with any of these diseases should not be permitted to suffer for want of care, food or comfort; but all his wants should be attended to by adults, or by those who are protected by proper vaccination or by having had the disease. Children and those who are not thus protected, should be kept away from these diseases. Do not go from the sick room to a child or other unprotected person until after change of clothing, and thorough washing of hands, face, hair, and beard. Always wash the hands thoroughly after any handling of the sick person or of anything that has been in contact with the sick person. Keep those who have been exposed to any of these diseases away from schools, churches, and other assemblies, and from all children until it is known whether they are infected,—and if they are found to be infected, isolate them till after complete recovery and thorough disinfection.

3. **Destroy** the contagium or special cause of the disease:—

a. By thoroughly disinfecting or destroying whatever is removed from the person sick or from the sick-room. All discharges from the patient should be received into vessels containing a strong solution of chlorinated lime (not less than one ounce to each discharge from the bowels) and then, in cities, thrown into the water-closet; elsewhere they should be buried at least 100 feet distant from any well; or where this is impracticable they may be received on old cloths which should immediately be burned or disinfected and buried.

b. By thoroughly disinfecting the sick-room and its contents, after removal of the sick person, whether by death or recovery.

Disinfect as follows: Burn whatever has been in contact with the sick person and is not too valuable to burn. Garments, sheets, blankets, etc., that will not be injured by bleaching, should be boiled for half an hour in a zinc-solution made by dissolving zinc sulphate and common salt in water, in the proportion of four ounces of the zinc sulphate and two ounces of common salt to one gallon of water. After death or recovery of the patient, subject the room and all its contents to the fumes of burning sul-

phur. Before fumigating, hang up and loosely spread out clothing, bedding, etc., that cannot be boiled in the zinc-solution, or spread it loosely over chairs in the sick-room, leaving the bedstead and other furniture in the room. Close all openings to the room very tightly. For a room ten feet square, place three pounds of sulphur in an iron pot or pan, that will not leak, supported on bricks over water in a tub. Set the sulphur on fire with live coals or with a spoonful of alcohol lighted by a match. Be careful not to breathe the sulphurous fumes. Leave the room tightly closed for several hours, then air it thoroughly. For a large room use a proportionally larger quantity of sulphur at the rate of three pounds for each 1,000 cubic feet of air space, and burn as much as possible of the sulphur used.

4. Keep your house and premises and everything connected therewith clean, but remember that *the contagium of these diseases may attach to the cleanest article* of clothing, food, drink, book, or paper if it is exposed thereto.

5. The law requires householders and physicians to notify the health officer, president, or clerk of the local board of health, of the first case and of every case of these diseases. The penalty for violation of this law may be as much as one hundred dollars.

Unless the local board of health orders otherwise, whoever violates the orders of the health officer is liable to a fine, and to imprisonment if the fine is not paid.

When the death of a person who has died from scarlet fever, diphtheria, or small-pox is announced in print, the notice should state the cause as "from scarlet fever," diphtheria, or small-pox, as the case may be, to prevent attendance at the funeral or visits to the house by persons liable to take the disease.

More complete statements of means of restricting and preventing these diseases, are in the pamphlets, issued by the State Board of Health, on the "Restriction and Prevention of Scarlet Fever," the "Restriction and Prevention of Diphtheria," the "Restriction and Prevention of Measles," the "Restriction and Prevention of Small-pox," and the "Prevention of Typhoid Fever," any of which may be had by addressing the Secretary of the State Board of Health, Lansing, Michigan.

FRAUDULENT IMITATION MILK.

The following is an account prepared by the Secretary of the State Board of Health, and given out to be published by the newspapers in order to warn dairymen and the public of the attempted fraud:

DAIRYMEN BEWARE! AN ATTEMPT AT FRAUDULENT MILK SUPPLIES IN MICHIGAN.

The same old milk fraud seems to have sprung up again, this time at Kalamazoo, Michigan. September 8, 1891, it was reported to the Office of the Secretary of the State Board of Health at Lansing, that parties from another city were active in trying to consolidate the dairy interests of Kalamazoo for the purpose of creating a market for their compound pretended to contain all the nutriment of pure milk, they claim to produce one pint of good milk, which would have the advantage of keeping indefinitely. The price of this extract (or compound) is *two dollars per gallon*, which, it is claimed, will make many gallons of "good milk."

These parties are trying to form a syndicate in the milk trade of Kalamazoo and other cities. Their plan is to have all producers of milk

sell to them, and then have all the milkmen buy of this firm, the milk which is to supply the citizens of Kalamazoo. They use the liquid and *add the water*, and propose to sell to consumers in Kalamazoo. But, however, the greater share of this fraudulent milk is to be sent to Chicago, to be used during the World's Fair.

It is said at Kalamazoo that a firm is now selling this kind of milk in Grand Rapids, and intend to do the same thing in all large cities and villages of Michigan.

The mixture has an alkaline taste, is about the color of weak coffee, and is transparent; it appears to be mainly glycerine.

Queer Results of Placing this Bad Milk in Hot Coffee.

In the Kalamazoo Gazette of Sept. 16, it is reported that Mr. W. H. Edwards, who buys his milk of a Mr. Baber, noticed a very peculiar result from placing this fraudulent milk in his coffee. He used quite a large amount of milk and placed it in his cup, and poured the hot coffee upon it. The coffee was allowed to nearly cool before drinking it. In the bottom of the cup was a substance which resembled glue in appearance. It was thick and stringy. Mr. Edwards took this glue-like substance from his cup and turned it over to Doctor Cornell for analysis. Mr. Edwards has several times before noticed that his coffee has a strange taste, but had never before noticed such a large quantity of sediment.

A sample of this fraudulent milk was sent to the Secretary of the State Board of Health; the Secretary immediately transmitted the sample to the State Laboratory of Hygiene at Ann Arbor, Michigan, with the request that an analysis be made. Accordingly an analysis was made by Prof. F. G. Novy, and the following is a copy of the Report made by Dr. Novy, Sept. 19, 1891:—

Analysis of Fluid With Which to Make Fraudulent Milk.

UNIVERSITY OF MICHIGAN,
LABORATORY OF HYGIENE,
Ann Arbor, September 19, 1891.

DR. HENRY B. BAKER, *Sec. State Board of Health,*

MY DEAR DOCTOR:—The examination of sample No. 1, purporting to contain all the nutriment of milk, etc., is completed and it is scarcely necessary to say that such a claim is entirely preposterous and shows at once upon its face its fraudulent character. On analysis it was found to contain:

Total Solids	44.88	per cent.
Common Salt	13.08	" "
Invert Sugar (Glucose)	14.62	" "
Cane Sugar	16.36	" "
	44.06	
Salicylic acid (present but not determined).		
	44.88	

The solution is probably colored by caramel.

Sample No. 2 has not arrived yet, but will test it as you desire when it does.

Very truly yours,

F. G. NOVY.

It will be seen by the foregoing analysis that the fluid which was sold for two dollars per gallon by men trying to work up a market for it in Kalamazoo, who claimed that by a little of this fluid the milkman could add water equal in quantity to the milk, and thus double his sales,—has been analyzed and found to contain about one-eighth common salt, about one-seventh glucose, about one-sixth cane sugar, and about one per cent salicylic acid, the rest being water slightly colored.

HENRY B. BAKER.

SHOULD A STATE LAW PROVIDE FOR PRIVIES AT RAILROAD STATIONS.

Doctor William C. Wells, Health Officer of Newfield Township, Newaygo County, Michigan, in a letter dated Nov. 11, 1891, wrote to the Secretary of the State Board of Health making complaint relative to the neglect of railroad companies in not supplying privies at railroad stations. Dr. Wells writes as follows:

"I have been importuned repeatedly by lady friends concerning the condition of small railroad towns that have no private conveniences for women. From what I am told, there seems to be a pressing necessity for women's closets, at these small towns, as frequently they are compelled to wait at them for hours where there are no conveniences provided by the railroad for them. It is suggested, could not the Board of Health see to it that such are provided for them?"

"White Cloud, Newaygo Co., is one place that is reported to me where women have suffered for such convenience. But I am told that this is a common thing through the State. I write this by request, and if this should be the means of bringing relief in this matter I should feel amply paid."

The Secretary replied to Dr. Wells that copies of his letter had been made and sent to each member of this State Board of Health, and a copy had been transmitted to the Hon. Charles R. Whitman, State Commissioner of Railroads. The Secretary of the State Board of Health wrote to the State Commissioner of Railroads: "I hope this evil of which Dr. Wells complains may be rectified."

In a letter dated Nov. 17, 1891, Hon. Charles R. Whitman writes to the Secretary of the State Board of Health as follows:

"Your letter of the 16th inst. enclosing communication to you from Dr. Wells, Health Officer, Newfield Township, Oceana Co., is received.

"I can find no provision in the statute conferring upon this Department the power to enforce the construction of privies, or water closets, by railroad companies, at their station houses. I shall recommend in my next communication to the governor that legislation should be had in this matter. I am aware that at many stations no conveniences of this nature are provided, and I have intended to urge that relief should be afforded by the next legislature. In the mean time in each case I shall do my utmost to urge upon the railroad companies the necessity of providing closets, especially for the use of women and children; and shall do so in the case referred to by Dr. Wells."

THE PREVENTION OF THE INTRODUCTION AND SPREAD OF DANGEROUS COMMUNICABLE DISEASES IN MICHIGAN IN 1891 AND 1892.

Notifications of Arrival of Immigrants.

In a letter dated Oct. 10, 1891, the Secretary of the Michigan State Board of Health requested of the Supervising Surgeon-General of the U. S. Marine Hospital Service that the Michigan Board receive notification of the name, destination of, and the disease possibly infected with, of all immigrants coming from infected vessels or localities through the Port of New York, who were destined to settle in Michigan. The Supervising Surgeon-General in a letter dated Oct. 28, 1891, replied that he would see that the Michigan Board was supplied with such a list as requested.

Accordingly lists were regularly received from New York. An effort was made to secure similar lists from other ports of entry on the Atlantic seaboard, but the immigration officers at such ports declined to supply such lists without orders from the Chief of the Immigration Bureau at Washington. While in Washington on other public-health business, the Secretary of this Board called upon the Chief of the Immigration Bureau, pointed out to him the utility of such a system of notification, and received assurance that such lists should be supplied from the ports of Boston, New York, Philadelphia and Baltimore.

Accordingly notices have been received of immigrants destined for Michigan arriving at the above-named ports, and copies have been made in the Office of the State Board of Health, and sent to the health officer of each locality, where it was the intention of the immigrant to settle, in order to give the local authorities opportunity to take such immigrants under surveillance, disinfect the baggage if necessary, and if any disease should be spread in the locality to know where to look for the source of contagium, and otherwise aid in the restriction of the disease. Prior to receiving notice of possibly infected immigrants, information had been received from localities that diseases had been spread through infected immigrants or the infected clothing of immigrants. It is believed that much good has been done in Michigan through these notifications to the local health authorities.

Samples of the notifications sent out from this office follow this paragraph. A copy of such notification was sent to each locality mentioned in it.

[SCARLET FEVER.]

MICHIGAN STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY,
Lansing, Mich., April 29, 1892.

HEALTH OFFICER OF ....., MICHIGAN.

DEAR SIR:—The following is the substance of a notice received at this office. It is forwarded to you in the hope that it may aid you in your efforts to do all that it is practicable to do to restrict the spread of dangerous diseases.

Very respectfully,

HENRY B. BAKER,
Secretary.

"U.S. IMMIGRATION SERVICE,
Port of New York, April 26, 1892.

I transmit herewith a list of immigrants going to localities within your State who arrived this day per Steamship 'Darmstadt' infected with Scarlet Fever."

Jss. Krook, Ironwood.
Catha Ekholm, Ironwood.
Mathia Bjorudahl, Sault Ste. Marie.
Matt. Nordman, Sault Ste. Marie.
Johan E. Hjorth, Houghton.
Ed. Hallbacka, Houghton.
Johan Back, Sault Ste. Marie.
Andrus W. Braimes, Ironwood.
Hy. Anderson, Negaunee.
Abil J. Mamulla, Negaunee.
Matth. Lihlchovoci, Bessemer.
Jrma Kalyorui, Metropolitan.
Hanrich Samuelson, Republic.
Elias E. Reutola, Republic.
Franz J. Haafala, Cadillac.
Isak J. Watanen, Cadillac.
Wilhelmia Isolehta and child, Gogebic.
Joh. Heusten, Wakefield.
Herm Mattuen, Wakefield.
Maria Tutila and child, Ishpeming.
Antonina Stavik and child, Detroit.
El. Nic Perlin, Wakefield.
Christian Juntido, Ishpeming.
Emma Lustig, Negaunee.
Juho Polai, Houghton.
Joh. H. Laudo, Ishpeming.
Johannes Feime, Ironwood.
Isak Bjorudahl, Sault Ste. Marie.
Aug. Grandham, Sault Ste. Marie.
Hendrik Froberg, Sault Ste. Marie.
Mich. Back, Houghton.
Mich. Glanhalm, Sault Ste. Marie.
Johan Jusaila, Bessemer.
Jas. A. Kuorekaska, Ishpeming.
Matte M. Myllymuki, Negaunee.
Abil J. Kurekoski, Ishpeming.
Herm Naas, Metropolitan.
Jas. Mackki, Ishpeming.
Jutro I. Sopalla, Republic.
John J. Kunseaic, Cadillac.
Tobias E. Hytteven, Cadillac.
Jures H. Jarvmen, Cadillac.
Tobias Perra, Metropolitan.
Joh Paova, Wakefield.
Emma M. Runska, Wakefield.
Matts Rantie, Ishpeming.
Johanna Tutila, Ishpeming.
Elias Parnon, Wakefield.
Emma M. Lumat, Bessemer.
Matte Korpela, Negaunee.
Juhi Orsola, Houghton.
Kusta Orgala, Houghton.
Samuel Tacholos, Onota.
Anti Flictale, Ishpeming.

Passengers per S. S. "Darmstadt" 2.

Isaac Mekuive, Ishpeming.
Simon Nikola, Red Jacket.
Isaac Macon, Onota.
Herm Remerva, Onota.
Sam. Sarjarwy, Onota.
Tobias Bukare, Negaunee.
Oztawe Mestele, Marquette.
Thomas Houryla, Ironwood.
Herm Gittele, Ironwood.
Sofia Hohanditti, Ironwood.
Mich. Muhelic, Calumet.
Oscar Takstyer, Marquette.
Sam Ekkio, Crystal Falls.
Juho Hurviloun, Ironwood.
Albert Theine, Detroit.
Jas. Bednarck, Detroit.
Matt Hersniek and wife, South Mills.
Otto Felling, Muskegon.
Karl Stenfors, Escanaba.
Jaakko Wirinekka, Marquette.
Sam. Ketui, Wakefield.
Ada Murtomaki, Ishpeming.
Anti Sulkakoski and child, Negaunee.
Elias Aurula, Ishpeming.
Kaapfo Lehimikoski, Ishpeming.
Erika Kukkas, Marquette.
Mat. Makmer, Ishpeming.
Jaro Hermasan, Onota.
Thos. Kotasmenny, Onota.
Jonas Perdola, Onota.
Anto Salanome, Negaunee.
Carle Snichkolen, Negaunee.
Mikko Tuora, Hancock.
Gustav Cordy, Weybourg.
Franz Turlawsky, Detroit.
Zuzna Mraz, Linwood.
Matti Merkila, Crystal Falls.
Jac. Simoli, Crystal Falls.
Matti Roizimas, Ironwood.
Aug. Theine, Detroit.
Johan Potzehurg, Detroit.
Maria Bocha, Wyburg.
Jos. Rosenholm, Escanaba.
Herm Murtomaki, Ishpeming.
Thos. Rakkola, Wakefield.
Herm Siltanen, Ishpeming.
Amalia Sulkakoski, Negaunee.
Matilda Kallas, Ironwood.
Joh. Talvitie, Ishpeming.
Jussi Mannessen, Marquette.
Lisa Hamm and three children, Champion.
Matilda Wirinalanien, Wakefield.

Matilda Mottonni, Wakefield.
Ida Kemfanien, Palmer.
Karoline Gverlitz, Detroit.
Liza Wallela and two children, Wyburg.
Elias Mattsan Rosi and wife. Negaunee.
Isak Nuro, Newburg.
Autti M. Walmiaki, Negaunee.
Sam Hosioga, Newberry.
Apran Mottonen, Negaunee.
Autti Kohtskoopi, Newberry.
Juho H. Hosiajas, Newberry.
Wilhelm H. Tiitu, Wakefield.
Johan Isawaki, Sault Ste. Marie.
Alex. Lahala, Sault Ste. Marie.
Matti Holt, Ishpeming.
Theodor Riha, Ishpeming.
Juha Laitmen, Sault Ste. Marie.
Ekki Saarchoski, Sault Ste. Marie.
Martin Szorez, wife and child, Detroit.
Gust. O. Rajomoko, Ishpeming.
August Gverlitz, Detroit.
Auguste Gverlitz, Detroit.
Friedrich Scheubbe, Lansing.
Karl Suranen, Ishpeming.
Antikustu F. B. Ravisio, Detroit.
Juho Oscar Haukke, Negaunee.
Juho S. Warpomen, Negaunee.
Axel Pulli, Newburg.
Elias R. Ajala, Newberry.
Abel Karkakanyas, Negaunee.
Matti Matonen, Negaunee.
Johan Johansan, Wakefield.
Iisakki Ahanen, Ironwood.
Juha Hekala, Sault Ste. Marie.
Kaarlo Hakowiaki, Sault Ste. Marie.
Gustav Yseonieppe, Sault Ste. Marie
Oscar A. Karniatta, Nekauma.
Juha Firmi, Ishpeming.
Jno. Nabor, wife and two children, Manistee.
Elias Pakkanon, Ishpeming.

[MEASLES.]

MICHIGAN STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY,
Lansing, Mich., June 20, 1892.

HEALTH OFFICER OF....., MICHIGAN.

DEAR SIR:—The following is the substance of a notice received at this office. It is forwarded to you in the hope that it may aid you in your efforts to do all that it is practicable to do to restrict the spread of dangerous diseases.

Very respectfully,

HENRY B. BAKER,
Secretary.

U. S. IMMIGRATION SERVICE,
Port of New York, June 16, 1892.

I transmit herewith a list of immigrants going to localities within your State, who arrived per Steamship "Noordland" reported to have measles on board.

Steamship "Noordland," disease, measles.

Destinations.—Names of persons possibly carrying infection:
Grand Rapids—Arim Brinner, Jan Brinner, Arim Elders, Johannes de Jauge.
Zeeland—David Bolier, wife and child; Jan Block.
Mackinaw—Wm. Novinski.
Calumet—Johann Kobe.
Detroit—Lassus Felix.

[SMALL-POX.]

MICHIGAN STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY,
Lansing, Mich., June 18, 1892.

HEALTH OFFICER OF....., MICHIGAN.

DEAR SIR:—The following is the substance of a notice received at this office. It is forwarded to you in the hope that it may aid you in your efforts to do all that it is practicable to do to restrict the spread of dangerous diseases.

Very respectfully,

HENRY B. BAKER,
Secretary.

U. S. IMMIGRATION SERVICE,
Port of New York, June 15, 1892.

The S. S. "America" arriving this day is infected with Small-pox, one case having developed on board during voyage. The patient was removed to Riverside Hospital and the passengers were vaccinated, and passed through this station.

Destination, Red Jacket:—Adam Lamanip, Sal. Lamanip.

Destination, Hancock:—Mats Pusa, Herm Roganen.

Destination, Iron Mountain:—Jas. Korpela, Amanda Huki, S. Sanska, Eric Tokoi.

Destination, Ironwood:—Sana Matsen, Marie Helgren and three children, Jas. Duidolski, Janos Macek.

Destination, Negaunee:—Albert Lissa, Erki Sisuli, Kalle Mamele, Lisa Lasilla, Nio Koskola, Hulda Latoula, Au Kekena.

Destination, Detroit:—Wojnich Cicgora, Andray Malaga, Jan Fary, Agata Marian.

Destination, Calumet:—Jas. Pernaner, Mati Bojanga.

Destination, Ishpeming:—Job Pentarmeki, Franz Sulala, Johan Perna.

Destination, Bessemer:—Amanda Jasna, Kalsa Jasna.

Destination, Oscoda:—Joh. Makilla, Jas Kylmapera, Henrika Kylma.

Various destinations:—Henrik Hekenen, Onota; Andros Roskosz, Menominee; Mato Zaborski and wife, Hermansville; Ottilie Gramms, Wyandotte.

Inspection of Immigrants and Travelers, and Disinfection of Immigrants' Baggage, at the Michigan-Canadian Border.

An account of the establishment of the Immigrant Inspection system at the Michigan-Canadian border, in the Autumn of 1891, is given in another part of this Report, under the head of "Small-pox in Michigan in 1891," pages 211-216. That account deals with the subject only as related to the prevention of the introduction of small-pox from the Province of Quebec, and the inspection was stopped as soon as the danger from small-pox was supposed to be over.

It would seem that the public safety and the best interests of the whole people, demand that an inspection service be continued at the points of entry into Michigan, at least during the season of greatest danger from the communicable diseases, especially as it coincides with the season of greatest immigration into the lumbering and other districts of Michigan. It would be for the best interests of the railroads, as well as for the people generally, that this inspection service be continued, because if small-pox or other dangerous diseases should break out in any locality, especially localities through which these great railroads pass, it would be very detrimental to their business—the travel would be much less. As regards the importance such an inspection and disinfection, for the welfare of the citizens of Michigan, other diseases than small-pox should be considered; diphtheria and measles cause many more cases of sickness, and many more deaths in Michigan every year than does small-pox. Consumption causes more deaths in Michigan in every year than any one other disease. It is a disease not very infrequently brought into Michigan in the person of an immigrant.

On December 17, 1891, the Secretary of the State Board of Health wrote to the Supervising Surgeon General of the United States Marine Hospital Service requesting that the inspection at Port Huron and Detroit be made permanent. He said that he believed, as the Governor had stated in the Governor's memorial to the Secretary of the United States Treasury, that the inspection and disinfection would tend to lessen the number of cases of sickness and deaths from diseases other than small-pox. It was argued that the inspection at Detroit and Port Huron should be permanent in the

same way as the inspection at New York, Boston, and other sea ports, and that it was important to have a continuous inspection in order to act promptly and effectively when immigration increases, because it takes considerable time to get an inspection service into efficient working order. It was also important to have officials ready to act in cases of outbreaks of dangerous disease as in the case of the immigrants at Port Huron, November 12, who were alleged to have small-pox, and which was afterwards proved to be varioloid.

Notwithstanding the requests for a continuous inspection at Port Huron and Detroit, in a letter dated January 8, 1892, the Supervising Surgeon-General informed the Governor of Michigan and the Secretary of the State Board of Health that the sanitary inspection at those ports would be discontinued on January 10, 1892. Accordingly the inspection was discontinued at Port Huron and Detroit.

HENRY INGERSOLL BOWDITCH, M. D.,*

PRESIDENT OF THE FIRST STATE BOARD OF HEALTH IN THE UNITED STATES OR IN NORTH AMERICA.—THE MASSACHUSETTS BOARD, ESTABLISHED IN 1869. ALSO A MEMBER OF THE FIRST NATIONAL BOARD OF HEALTH, ESTABLISHED IN 1879.

Dr. Henry Ingersoll Bowditch died in Boston, Mass., January 14, 1892, in the eighty-fourth year of his age, after a long illness, which he bore with such courage and cheerfulness and manly patience that it was a benediction to be near him.

He was born in Salem, August 9, 1808. As a schoolboy he was kind, generous, sympathetic, truthful, manly, but thoroughly a boy, in the sports with his fellow playmates. From the open-air life insisted upon by his father, came the healthy mind in the sound body.

In college, where he entered as a sophomore, he was the same warm hearted, good fellow, straightforward, impulsive, pugnacious, ardent—although not an ardent scholar—sensitive, respected, always to be depended upon.

After taking the degree of A. B., at Harvard in 1828, and later the A. M., he graduated at the medical school in 1832, having also been house-officer at the Mass. General Hospital. Dr. Bowditch spent two years in Europe, studying for the most part with Andral, Chomel, and especially Louis, whom he fondly called his master. Dr. Bowditch came back to Boston full of enthusiasm for Louis' methods, where, indeed, he found Dr. Jacob Bigelow, his senior by twenty-one years, already a pioneer in the close study of nature and the careful observation, faithful records, and accurate analysis of facts as the true basis of medical knowledge and practice. While waiting for practice Dr. Bowditch devoted much of his time to benevolent work, and took great pleasure in helping those who needed encouragement or assistance, especially the young—interests which he kept up to the last. Having by chance been an eye-witness of the famous Garrison mob in 1835, his quick sympathy and intelligent foresight led him to devote his "whole heart to the abolition of slavery." "But," he adds in his diary, "even anti-slavery never has taken me away from constant labor for the elevation of medicine." His work for anti-slavery

* The following are extracts from the Obituary by C. F. Folsom in "The Harvard Graduate Magazine," vol. 1, Oct., 1892, pp. 38-43.

was so vigorous that it caused him many enemies, but he kept his good work up, and lived to see slavery abolished, peace and industry established in the South, and himself honored with Phillips and Garrison, and loved by his Southern Associates.

With the same qualities he conquered success in his chosen profession. He became admitting physician, 1838 to 1845, and later visiting physician, 1846 to 1864, at the Massachusetts General Hospital, visiting physician at the Boston City Hospital, 1868 to 1871; consulting physician to the Massachusetts General, City, Carney, and New England Hospitals; professor of clinical medicine in the Harvard Medical School, 1859 to 1867; a member of the leading medical societies in Boston; President of the American Medical Association in 1876. He was a member of the American Academy of Arts and Sciences, of the Paris Obstetrical Society, of the Paris Society of Public Hygiene, and honorary member of the New York Academy of Medicine, of the Philadelphia College of Physicians, and of the New York, Rhode Island, and Connecticut State Medical Societies. He was the first President of the first State Board of Health in North America.

To his professional associates he was an inspiration; to the younger men his unfailing kindness of heart and generosity gave strength and courage; the example of his life raised them to a higher plane of living. He was foremost in surgery. In sanitary science he, too, led the way. With the eloquence of sincerity, showing to a committee of the legislature his chart indicating the prevalence of pulmonary consumption in Massachusetts, he explained to them the law which he had discovered, in 1862, of its relation to soil-moisture, and did much to persuade them to create the first State Board of Health in this country,—an example which thirty States have followed. When the Board was appointed, in 1869, Dr. Bowditch was easily first in the estimation of the medical profession and the community, for the arduous and responsible duties of its president,—a position which he retained, at great sacrifice of his time and professional income, until 1879. When the powerful interests, attacked by the Board in the cause of the public health, resisted, and the politicians threatened, and other members of the Board hesitated, he pushed on, ardent and impulsive, until the point was gained. If his enthusiasm carried him too fast or too far, he was always ready to modify his course. If in his vehement indignation and scathing rebuke of anything which he considered mean or unworthy, he had seemed to wrong any one, he was quick with generous redress. His simplicity and earnestness were so transparent that, as one of the members of the Board said, there could be no real dissention in a board of which he was the chairman; and his sense of humor, love of fun, and quick intuition helped him out of many difficult places.

When the yellow fever epidemic of 1878 aroused the nation to the need of a National Board of Health, the chairmanship seemed the opportunity of Dr. Bowditch's life. No one else had the personal qualities and reputation to fill the place. Unfortunately the state of his health prevented his accepting it, or, indeed, of serving as a member of the board for more than a year; and there followed its melancholy wreck, which so many thought that he, if he had been chairman, might have averted.

He was one of the earliest advocates of specialties in medicine in this country. He was one of the first to believe in women as physicians.

More than 90,000 manuscript pages of record of cases of private patients, ten printed papers, and sixty-six pamphlets, attest the industry of his life.

His epoch-making work in medicine was his thoracentesis, his first operation with Dr. Wyman's aspirator having been done in 1850, some time after Dr. Morrill Wyman's "brilliant operation." In the meetings of the American Medical Association, he was one of the most active members; and during the Civil War he was an untiring worker in numberless ways. He was enrolling surgeon, and to him more than any other single individual was due the persistent effort by which Congress passed the law creating an efficient ambulance service in the army.

Dr. Bowditch's home life was ideal: "I think of his home as more filled with love than any other home I ever knew," writes a friend of his.*

A PROPOSED AMENDMENT TO THE HEALTH LAWS.

All Reports of Dangerous Contagious Diseases Should be Made to the Health Officer.

Complaint has been made to the Secretary of this Board that "Health officers cannot secure reports until the law is changed so that all reports of dangerous Diseases shall be made to such officer. As at present rival physicians refuse and neglect to so report, and township and village clerks pay no attention to the matter."*

At the meeting of the State Board of Health in April, 1892, Dr. Baker presented the subject of the Annual and Special Reports required to be made by all clerks of local boards of health. Under present circumstances an extraordinary amount of work is required to learn the facts respecting the occurrence or non-occurrence of the dangerous diseases in the localities throughout the State. He thinks much of this could be done away with, by such a change in the law as would require every case of all such diseases to be reported to the health officer. Now they may be reported to either the health officer, president or clerk of the local board of health; and, in order to learn about all of them, it is necessary to have reports from all these officers. Accordingly, reports have been required, under the law, from the health officers and clerks. And in order to have all reports made locally, reports should be required of the presidents. Comparatively few cases of dangerous diseases are reported by the clerks (except in such cities as Grand Rapids, in which all such records are kept by the clerk), and if the law required all such reports to go to the health officer, we could relieve the clerks of all townships, and of most of the cities and villages, from making reports on this subject. This would be a

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* The foregoing are extracts from the Obituary by C. F. Folsom, in "The Harvard Graduate Magazine," Vol. 1, October, 1892, pp. 38–43.

* Quoted from letter from Dr. C. E. Davis, health officer of the village of Marcellus, Cass county, dated Feb. 23, 1891.

welcome relief to over a thousand officials, and would greatly lessen the work and expenses of the Office of the State Board of Health.

The most important reason, however, for the proposed change in the law, is that the law very properly requires of the health officer the performance of very important duties on the occurrence of a dangerous disease, therefore he is the person who should always be promptly notified. Under the present law, which permits the notice to go to other officers who are not individually required to act, the health officer may not be informed until too late to prevent the spread of the disease.

In the form of a circular, the foregoing paragraphs under the same head "A proposed amendment to the health laws," were sent to each president and clerk of a local board of health in Michigan, urging that those officials use their influence to secure the proposed change in the State law.

REPORT OF THE SECRETARY RELATIVE TO PROPERTY, ETC., FOR THE FISCAL YEAR ENDING JUNE 30, 1892.

To the President and Members of the Michigan State Board of Health:

GENTLEMEN:—In compliance with Section 5 of Article II. of the by-laws of this Board, the following report of the "Nature and amount of property belonging to the Board, which has been received, issued, expended and destroyed since the last report, and of the property remaining on hand, and also in whose care each item of property is intrusted," is respectfully submitted.

My last report is printed on pages lxxxvi–xcix, of the Annual Report for the year 1891.

INSTRUMENTS PURCHASED.

There were no instruments purchased for the Board during this fiscal year.

METEOROLOGICAL INSTRUMENTS LOANED.

Meteorological instruments have been intrusted to observers during the fiscal year ending June 30, 1892, as follows:

One barometer, and box for protection, one dry-bulb thermometer, one wet-bulb thermometer, board, clips, cup and wick, one maximum and one minimum registering thermometers, with board, etc., for hanging, were sent to J. W. Ash, Ashton, Osceola county, January 25, 1892.

One maximum thermometer and one minimum thermometer were sent to Lieut. A. H. Boies, Hudson, Michigan, to replace the maximum and minimum thermometers returned to this office on October 7, 1891, which were disabled by long use.

One psychrometer cup was sent to Dr. W. C. Gates, Rockland, Mich.

METEOROLOGICAL INSTRUMENTS ON HAND JUNE 30, 1892.

Three barometers. (Including the one in use in Office of Secretary of the State Board of Health.)
Thirteen dry-bulb thermometers. (Including one in use in instrument shelter.)
Seven wet-bulb thermometers. (Including one in use in instrument shelter.)
One standard thermometer.
Four minimum thermometers. (Including one in use in instrument shelter.)
Two maximum thermometers. (Including one in use in instrument shelter.)
One standard thermometer for inspecting oils.
Three registering thermometer boards. (Including one in use in instrument shelter.)
Eight psychrometer boards. (Including one in use in instrument shelter.)
Four psychrometer cups. (Including one in use in instrument shelter.)
Seven minimum thermometer clips.
Four wet bulb clips.
Six screw bolts for registering thermometers.
Six pins for registering thermometers.
One hook for hanging barometer.
Three barometer boxes. (Including one in use in Office of Secretary of State Board of Health.)
Three raingauges. (Including one in use by observer at Lansing.)
One basin for raingauge.
Two caps for overflow tubes to raingauges.
Two snow gauges.
One Draper's self-registering thermometer. (In use in instrument shelter.)
One anemometer complete. (In use in the Office of Secretary of the State Board of Health.)
Three minimum thermometers and two maximum thermometers spoiled by long exposure, etc.
Three psychrometer cups spoiled by rust and long exposure.
Seven psychrometer cups injured by use, but can be re-soldered.
Twenty-one thermometers accidentally broken by observers since the Board was established.
One worn-out anemometer spindle.

PHOTO-ENGRAVED PLATES PURCHASED.

There were no plates purchased by this Board during the fiscal year. There were, however, fifteen plates ordered by the Secretary; but, as the plates were to illustrate the Annual Report and Supplements, the bills for these plates were audited by the Board of State Auditors. These plates are stored in the Office of this Board for convenient use.

PHOTO-ENGRAVED PLATES LOANED.

Plates that have been loaned from the Office, and not yet returned, are as follows:—

TO DR. A. N. BELL, BROOKLYN, N. Y.

"Diagram No. 8.—Temperature and Sickness from Pneumonia in U. S. Armies."
"Diagram No. 10.—Temperature and Deaths from Phthisis in London."
"Diagram No. 11.—Temperature and Sickness from Consumption in Michigan."
"Diagram No. 14.—Temperature and Sickness from Respiratory Diseases in India."
"Diagram No. 4.—Small-pox and Temperature in Massachusetts."
"Diagram No. 9.—Temperature and Deaths from Small-pox in London."

TO ROBERT SMITH & CO., STATE PRINTERS AND BINDERS, LANSING, MICHIGAN.

"Typhoid Fever, Sewer and Water Supply" in Munich and other cities.
"Isolation and Disinfection Restricted Diphtheria in Michigan in 1889."
"Typhoid Fever and Proximity of Wells to Privies in Iron Mountain, Mich."
"Low Water in Wells and Sickness from Typhoid Fever in Michigan. By months for a period of 10 years, 1878 and 1880-88."
"Pathogenic Micro-Organisms 'Germs' of Disease."

ACCESSIONS TO THE LIBRARY.

Books and other publications which have been received and placed in the library of the Board during the fiscal year ending June 30, 1892, as follows;—

Samuel W. Abbott, M. D., Boston, Mass.:—
Twenty-second Annual Report of the State Board of Health of Mass.
Forty-ninth Registration Report of Massachusetts. Year 1890.

Robert Austin, Portland, Oregon:—
Mayor's Message and Municipal Reports, City of Portland, Oregon, 1890.

Steele Bailey, M. D., Stanford, Ky.:—
Thirty-sixth Annual Meeting of the Kentucky State Medical Society, held at Lexington, Ky., May 27-29, 1891.

Henry B. Baker, M. D., Lansing:—
Addresses, Papers, and Discussions in the Section of State Medicine, at the Forty-second Annual Meeting of the American Medical Association, at Washington, D. C., May 5-8, 1891.

Lewis Balch, M. D., Albany, N. Y.:—
Local Boards of Health in the State of New York.
Eleventh Annual Report of the State Board of New York. Vol. i., and Vol. ii.

James A. Barwick, Sacramento, Cal.:—
Annual Meteorological Review of the State of California for the year 1891.

H. B. Battle, Ph. D., Raleigh, N. C.:—
Annual Report of the Meteorological Division of the North Carolina Agricultural Experiment Station, Constituting the N. C. State Weather Service. Year 1890.

Dr. K. Becker, Berlin, Germany:—
Monatshefte zur Statistik des Deutschen Reichs, 1891-1892.

John M. Berry, Worcester, Mass.:—
Proportional Representation—The Grove System.

James Bishop, Trenton, N. J.:—
Thirteenth Annual Report of the Bureau of Statistics of Labor and Industries of New Jersey, for the year ending October 31, 1890.

Hon. James G. Blaine, Washington, D. C.:—
Report on Cholera in Europe and India. By Edward O. Shakespeare.

Richard Bliss, Newport, R. I.:—
One hundred and sixty-first Annual Report of the Director of the Redwood Library, Newport, R. I., Aug. 19, 1891.

Board of Health, Burlington, Vt.:—
Annual Report of the Board of Health of the City of Burlington, Vt., 1891.

Board of Health of Hartford, Conn.:—
Seventh Annual Report of the Board of Health of the City of Hartford, for the year ending Feb. 29, 1892.

Board of Health, Portland, Maine:—
Seventh Annual Report of the Board of Health of the City of Portland, Maine, year ending Feb. 29, 1892.

Board of Health, Wilmington, Del.:—
Annual Report of the Board of Health of the City of Wilmington, Delaware, 1891.
Law, Ordinances, Rules and Regulations pertaining to the Health of the City of Wilmington, Del., March, 1892.

Dr. Victor Böhmert, Dresden, Germany:—
Zeitschrifte des K. Sächsischen Statistischen Bureaus xxxvi., 1890-1891.

Philip Boobblyer, M. B., Nottingham, England:—
Report of the Borough of Nottingham, year 1890.

John H. Bowker, Passaic, N. J.:—
The Sanitary Code with Amendments of the City of Passaic, N. J.
Rules and Regulations of the Board of Health of Passaic, N. J.

Edwin H. Brigham, Boston, Mass.:—
Medical Communications of the Mass. Medical Society, Vol. xv., No. ii., 1891.

Peter H. Bryce, M. D., Toronto, Ontario:—
Report on Disposal of Sewage by a Special Committee of the Association of Executive Health Officers of Ontario.
Diphtheria Regulations. December 28, 1891.
Ninth Annual Report of the Provincial Board of Health of Ontario. 1890.

Charles H. Burbanks, Lowell, Mass.:—
Annual Report of the Trustees of the City Library of Lowell, Mass., 1890.
Annual Report of the Trustees of the City Library of Lowell, Mass., 1891.

Dr. Leo Burgerstein, Vienna, Austria:—
Die Arbeitskurve einer Schulstunde.
Uber Hygienische Untersuchung der Schulverhaltnisse.

Bureau of Education, Washington, D. C.:—
Rules for a Dictionary Catalogue.
Publications of the U. S. Bureau of Education.
Circular of Information No. 2.—The Fourth International Prison Congress, St. Petersburg, Russia.
Circular of Information No. 6.—History of Higher Education in Mass.
Circular of Information No. 5.—The History of Higher Education in Ohio.
Bulletin No. 11 of the Bureau of Education. History of Higher Education in Michigan.

Bureau of Mycology, Dept. of Agrl., Washington, D. C.:—
The Journal of Mycology.

Bureau of Statistics, Treasury Department, Washington, D. C.:—
Quarterly Report of the Chief of the Bureau of Statistics, Treasury Department of the United States, for the Three months ending March 31, 1891.
Quarterly Report of the Bureau of Statistics of the United States, for the quarter ending June 30, 1891.

Quarterly Report of the Chief of the Bureau of Statistics, Treasury Department, Relative to Imports, Exports, etc., for the quarter ending Dec. 31, 1891.

Quarterly Report of the Chief of the Bureau of Statistics, Treasury Department, relative to Imports, Exports, etc., of the U. S., for the three months ending Sept. 30, 1891.

C. W. Chancellor, M. D., Baltimore. Md.:—

Ninth Biennual Report of the Maryland State Board of Health, 1890-91.

Improved Method of Sewage Disposal. The Chancellor Patent Process.

Charles V. Chapin, M. D., Providence, R. I.:—

Thirty-sixth Annual Report upon the Births, Marriages, and Deaths, in the City of Providence for the year 1890.

William H. Carmalt, New Haven, Conn.:—

Transactions of the Congress of American Physicians and Surgeons, Second Triennial Session, Washington, D. C., Sept., 1891.

A. R. Carter, Baltimore, Md.:—

Health Department of the City of Baltimore—Mortality Reports--1891.

W. C. R. Colquhoun, Wilmington, Del.:—

Report of the President of the Board of Health, of the City of Wilmington, Delaware, for the year ending December 31, 1890.

G. P. Conn, M. D., Concord, N. H.:—

Transactions of the New Hampshire State Medical Society at its Centennial Anniversary, 1791-1891.

Cornell University, Ithaca, N. Y.:—

Bulletins of the Experiment Station, 1891-1892.

H. A. Crandall, M. D., Burlington, Vt.:—

Annual Report of the Health Officer of the City of Burlington, Vt., 1891.

Henry W. Crane, New York City:—

One hundred and twenty-first Annual Report of the New York Hospital and Bloomingdale Asylum, 1891.

F. M. Crudden, St. Louis, Mo.:—

Annual Report of the St. Louis Public Library, 1890-91.

Paschal Davis, M. D., Keokuk, Iowa:—

Sixth Annual Report of the Board of Health of the City of Keokuk, Iowa, year ending March 31, 1892.

Martin Dawson, Chicago, Ill.:—

Proceedings of the Eighth Annual Convention of the National Confectioners' Association of the United States. Official Record of Reports, Circulars, etc., for the year 1890-1891.

N. H. R. Dawson, Washington, D. C.:—

Higher Education in Indiana, by James A. Woodburn.

Director of Bureau of Public Sanitation, Rome, Italy:—

Il Regolamento Sul Meretricio davantial Consiglio Superiore di Sanita.

Regolamento Sul Meretricio Nell 'Interno Dell' Ordine Pubblico della Salute Pubblica e del Buon Custome.

Circa I Fatti Principali Rigaurdanti L'Igiene e la Sanita Pubblica Nel Regno.

Sulla Filtrazione dei Liquami Putrescbili Attraverso la Torba.

Su du un Apparecchio destinato Allo Studio della Permeabilita All' Acqua dei Materiali da Contruzione.

Azione dei Microfite sin Composti Arsenicali Fissi.

Director of the Meteorological Observatory, Rome, Italy:—

Pubblicazioni della Specola Vaticana, Fascicola ii., 1891.

George Dock, M. D., Ann Arbor, Michigan:—

Further Studies in Malarial Diseases.

Notes on the Parasite of Quartan Malarial Fever and a word on the Varieties.

Observations on the Amoebae Coli in Dysentery and Abscess of the Liver.

John Dryden, Toronto, Ontario:—

Report relating to the Registration of Births, Marriages, and Deaths in Ontario for the year 1890.

George F. Dudley, M. D., St. Louis, Mo.:—

Fourteenth Annual Report of the Commissioner of Health of the City of St. Louis, Mo., 1890-1891.

Samuel Duffield, M. D., Detroit, Michigan:—

Tenth Annual Report of the Board of Health of the City of Detroit, 1890-1891.

John W. Dupree, M. D., Baton Rouge, La.:—

Disposal of Sewage—An Abstract from the Report of the Health Officer of Baton Rogue, La., for the year 1891.

Hon. A. A. Ellis, Lansing:—

Report of the Attorney General of the State of Michigan, year ending June 30, 1891.

The Engle Sanitary and Cremation Co., New York City:—

A pamphlet on the Disposal of Waste and Excreta.

E. D. Ferguson, M. D., New York City:—

Transactions of the New York State Medical Society, Vol. 8, 1891.

J. D. Fernandez, M. D., Jacksonville, Fla.:—

Proceedings of the Florida Medical Association, Session of 1891.

Charles H. Fisher, M. D., Providence, R. I.:—

Thirteenth Annual Report of the State Board of Health, of the State of Rhode Island. Year ending December 31, 1890.

William E. Foster, Providence, R. I.:—

Fourteenth Annual Report of the Public Library of the City of Providence, R. I., year 1891.

E. A. Fuertes, Ithaca, N. Y.:—

Second Annual Report of Commissioners of the State Meteorological Bureau and Weather Service of the State of New York, 1890.

Fuller and Warren Co., Troy, N. Y.:—

Warming, Ventilation and Sanitary Construction.

Peter Fyfe, Glasgow, Scotland:—

Twenty-first Annual Report of the Operations of the Sanitary Department of the City of Glasgow, Scotland, year 1890.

Dr. Geikler, Dresden, Germany:—

Kalender und Statistisches Jahrbuch fur das Konigreich Sachsen Jahr, 1892.

H. M. Goodman, M. D.,
The Snook-Herr Poisoning Case.

Dr. H. Gradle, Chicago, Ill.:—
Lectures on General Etiology.

William E. Griffis, D. D., Boston, Mass.:—
The Influence of the Netherlands in the making of the English Commonwealth and the American Republics.

Thomas W. Grimshaw, Registrar General, Dublin, Ireland:—
Quarterly Returns of Births, Marriages, and Deaths, Registered in the Provinces, Counties, etc., in Ireland.

R. B. S. Hargis, M. D., New Orleans, La.:—
Letter to the Florida Medical Association.

Prof. Mark W. Harrington, Washington, D. C.:—
Instructions for use of Rain-Guage. Circular C., Instrument Room. Directions for use of Maximum and Minimum Thermometers. Circular B. Instrument Room.
U. S. Department of Agriculture, Experiment Station Bulletin No. 10, Meteorological Work for Agricultural Institutions.
Special Report of Chief of the Weather Bureau to the Secretary of Agriculture, 1891.

George Hess Co., Chicago, Ill.:—
The Ventilation of Homes.
Warm Air Heating, Ventilating, and the Deodorized Sanitary Dry Closet. Thomas F. Wood, M. D., Wilmington, N. C.

Charles W. Hitchcock, M. D., Detroit, Michigan:—
Transactions of the Michigan State Medical Society, year 1891.

Prof. Edward Hitchcock, Amherst, Mass.:—
The Anthropometric Tables of Amherst College, 1892.

George Holman, M. D., St. Louis, Mo.:—
Annual Report of the State Board of Health of the State of Missouri, 1890.
Annual Report of the State Board of Health of the State of Missouri, 1891.

Henry F. Hoyt, M. D., St. Paul, Minn.:—
Annual Report of the Commissioner of Health of the City of St. Paul, for the year ending Dec. 31, 1890.

George P. Humphrey, Rochester, N. Y.:—
Second Annual Report of the Metropolitan Board of Health, of the State of New York, 1867.

Ezra M. Hunt, M. D., Trenton, N. J.:—
Cities: Their needs and regulations for promoting the health of their inhabitants. Circular No. 73.
Protection of Schools from Communicable Diseases, Methods to be observed when they occur. Circular No. 76.
Diphtheria. Circular No. 77 to Physicians and Local Boards of Health.
Institutional Inquiry into Sanitary Conditions. Circular No. 78.

Imperial Bureau of Health, Berlin, Germany:—
Die Berliner Volkszhlung, von 1890.

Indian Office, London, England:—
Twenty-Sixth Annual Report of the Sanitary Commissioner with the Government of India, 1889.

Prof. C. L. Ingersoll, Lincoln, Neb.:—
Fifth Annual Report of the Agricultural Experiment Station at University of Nebraska, 1891.
Bulletin No. 19 of the Agricultural Experiment Station, University of Nebraska.

Iowa State Board of Health, Des Moines, Iowa:—
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Kaiserliches Gesundheitsamt, Berlin, Germany:—
Influenza in 1889, 1890, and 1891. Tables and Diagrams.

J. F. Kennedy, M. D., Des Moines, Iowa:—
Sixth Biennial Report of the Iowa State Board of Health for the period ending June 30, 1891.

William Watt Kerr, M. D., Los Angeles, Cal.:—
Transactions of the State Medical Society of California, Session of 1891.

K. Kobayashi, Tokio, Japan:—
Monthly Summaries and Monthly Means for the year 1890. Meteorological Central Observatory.

Dr. Köhler, Berlin, Germany:—
Beitrage zur Buertheilung des Nutzens der Schutzpokenimpsung nebst Mittheilungen über Mafzregeln zur Beschasung untadeliger Thierlumphe.
Die Verbreitung des Heilpersonals der Pharmasentischen Unstalten und des Pharmasentischen Personals im Deutschen Reiche.
Das Kaiserliche Gesundheitsamt.

J. R. Laine, M. D. Sacramento, Cal.:—
Diphtheria: Its Restriction and Prevention.

R. J. Laing, M. D., Reading, Penn.:—
Report of the Board of Health of the City of Reading, Penn., year 1891.

Louis Laberge, M. D., Montreal, Quebec:—
Report on the Sanitary State of the City of Montreal; also an account of the Operations of the Board of Health and Vital Statistics, 1890.

Benjamin Lee, M. D., Philadelphia, Penn.:—
Report of the Pennsylvania State Board of Health, 1889.
Report of the Pennsylvania State Board of Health, 1890.
School Hygiene, Pamphlet No. 2.

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Report on the Influenza Epidemic of 1889-1890, by Dr. Parsons.

Robert Williamson Lovett, Boston, Mass.:—
Bulletin of the Harvard Medical School Association. Report of the first Annual Meeting held in Boston, June 23, 1891.

E. S. McClellan, New York City:—
The Sewer Gas Question.
Trap-Syphonage and Trap Seal Protection.

H. S. McMaster, M. D., Dowagiac, Michigan:—
Annual of Eclectic Medicine and Surgery, for 1891, Vol. II.

Thomas A. Means, M. D., Montgomery, Ala.:—
Transactions of the Medical Association of the State of Alabama, Huntsville, April 14-18, 1891.
The Report of the Board of Health of the State of Alabama, year 1889.

William E. Magill, Lansing, Michigan:—
Twenty-second Annual Report of the Commissioner of Insurance of the State of Michigan, 1891.

T. C. Mendenhall, Washington, D. C.:—
U. S. Coast and Geodetic Survey, Report for the year 1890.

C. N. Metcalf, M. D., Indianapolis, Ind.:—
Tenth Annual Report of the State Board of Health of Indiana, for the year ending Oct. 31, 1891.
Ninth Annual Report of the State Board of Health of Indiana, Fiscal year ending Oct. 31, 1890.

Meteorological Central Observatory, Tokio, Japan:—
Annual Meteorological Report for the year 1888 of the Meteorological Central Observatory, Tokio, Japan, Part I. and Part II.
Annual Meteorological Report for the year 1889, of the Meteorological Central Observatory, Part I. and Part II.
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Meteorological Institut, Utrecht, Netherlands:—
Nederlandsch Meteorologisch Jaarboek voor 1890.

Michigan State Board of Health, Lansing, Michigan:—
The Time of Greatest Prevalence of Each Disease in Michigan, in 1889.
Proceedings and Addresses of the Iron Mountain Sanitary Convention, Oct. 30 and 31, 1891.
The Restriction and Prevention of the Dangerous Communicable Diseases, by Henry B. Baker, M. D.
The Water Supply of Negaunee, by Dr. C. S. Lombard.
The Restriction and Prevention of the Dangerous Communicable Diseases, from the Standpoint of the State Board of Health, by Dr. Henry B. Baker.
How Much Ought Negaunee to pay its Health Officer? By Henry B. Baker, M. D.
Proceedings and Addresses at the Sanitary Convention held at Negaunee, Michigan, August 13 and 14, 1891.
Restriction and Prevention of Diphtheria.
Restriction and Prevention of Scarlet Fever.
Names and Addresses of Health Officers in Michigan for the year 1891-2.
Petition for the Abatement of an Alleged Nuisance.
The Water Supply of Cities.
The Hygiene of Schools.
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Leaflet on Dangerous Contagious Diseases.
Proceedings and Addresses of a Sanitary Convention held at Charlevoix, Michigan, August 14 and 15, 1890.
The Causation and Prevention of Diphtheria, by A. Hazlewood, M. D.
The Causes and Prevention of Consumption, by William Ziegenfuss, M. D.

Minister of Education, Tokio, Japan:—
Seventeenth Annual Report of the Minister of State for Education, 1889.

Ministero Dell' Interno, Rome, Italy:—
Experimenti Comparativi Di Disinfezione Con vapore Acqueo fatti colle Stufe Geneste-Herscher ed Hennemberg.
Della Correzione die Vini Ingessati Mediante Il Tartrato Di Strozio.

George C. Moitt, M. D., Manchester, N. H.:—
Annual Report of the Board of Health of the City of Manchester, N. H., 1891.

F. Montizambert, M. D., Quebec, Canada:—
Report on Quarantine and Public Health, Medical Supt. of St. Lawrence Quarantines, for 1891.

Hon. John O'Brien, Jackson, Michigan:—
Report of the State Inspector of Illuminating Oils, 1891.

M. O'Brien, M. D., Topeka, Kansas:—
Seventh Annual Report of the Kansas State Board of Health, 1891.

Paul Paquin, M. D., Battle Creek, Michigan:—
The Bacteriological World, Vol. 1, 1891.

C. W. Parsons, M. D., Detroit, Michigan:—
Proceedings of the Michigan State Pharmaceutical Association, Oct., 1891.

Elzear Pelletier, M. D., Montreal, Quebec:—
By-Laws and Regulations of the Board of Health of the Province of Quebec.

Charles F. Peck, Commissioner of Labor, Albany, N. Y.:—
Eighth Annual Report of the Bureau of Statistics of Labor of the State of New York, year 1890, Part i. and Part ii.

George H. Person, C. E., Kalamazoo, Michigan:—
The Purification of Sewage by Application to the Soil.

Edward C. Pickering, Cambridge, Mass.:—
Bulletin of the New England Meteorological Society in coöperation with the Astronomical Society of Harvard College, and U. S. Signal Service, with Appendix, for 1890.

Hon. Henry D. Platt, Ypsilanti:—
Report of the State Inspector of Illuminating Oils of the State of Michigan, year ending December 31, 1890.

Joseph Y. Porter, M. D., Jacksonville, Fla.:—
Rules and Regulations of the State Board of Health of Florida.

H. R. Pratt, Lansing, Michigan:—
Report of the Auditor General of Michigan for 1885.
Report of the Auditor General of Michigan for 1887.
Report of the Auditor General of Michigan for 1888.

J. W. Prendergast, M. D., Cincinnati, Ohio:—
Twenty-fourth Annual Report of the Department of Health of the City of Cincinnati, for the year ending December 31, 1890.

C. O. Probst, M. D., Columbus, Ohio:—
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Fifth Annual Report of the State Board of Health of Ohio. Year ending Oct. 31, 1890.
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Report of Committee of Investigation of the Cincinnati Water Supply, 1892.

T. Mitchell Prudden, M. D., New York City:—
A Study of Experimental Pneumonitis in the Rabbit.
Studies on the Action of Dead Bacteria in the Living Body.
The Elements of Contagion in Tuberculosis.

George W. Rafter, M. A., S. M., Rochester, N. Y.:—
On the Micro-organisms in Hemlock Water.

John H. Rauch, M. D., Springfield, Ill.:—
Eleventh Annual Report of the Illinois State Board of Health for 1888.

M. P. Ravenel, M. D., Charleston, S. C.:—
Transactions of the South Carolina Medical Association, meeting held in Anderson, S. C., June 9 and 10, 1891.

R. Harvey Reed, M. D., Mansfield, Ohio:—
Slaughter Shops.
Third Annual Report of the City of Mansfield, Ohio, year ending Feb. 28, 1891.

P. C. Remondino, M. D., San Diego, Cal.:—
Ventilation and Impure Air as Prophylactic or Causative of Disease.

J. T. Reeve, M. D., Appleton, Wis.:—
Thirteenth Annual Report of the Wisconsin State Board of Health, 1890.

Dr. James A. Russell, Edinburgh, Scotland:—
Transactions of the Royal Scottish Society of Arts, Vol. xii., part iv.
Proceedings of the Royal Society of Edinburgh. Session, 1889-1890 and 1890-1891.

Dr. James B. Russell, M. D., Glasgow, Scotland:—
Old Glasgow and its Statistical Divisions, April 5, 1891.

W. L. Schenck, M. D., Topeka, Kansas:—
Address on State Medicine.
The Relation of Alcoholics to Preventive and State Medicine.

T. S. Scales, M. D., Mobile, Ala.:—
Report of the Board of Health of Mobile, Ala., 1891.

Dr. Paul Schreiber, Chemnitz, Saxony:—
Deutches Meteorologisches Jahrbuch fur 1890.
Reicht über die Thätigheit im Königl. Sächsischen Meteorologischen Institut fur das Jahr 1889.
Deutsches Meteorologisches Jahrbuch fur 1890.

Nagayo Sensai, Tokyo, Japan:—
A Summary of the two Annual Reports of the Central Sanitary Bureau, attached to the Home Department of the Imperial Government, 1888-89.

Henry Sewall, Ph. D., M. D., Denver, Col.:—
Infectious Diseases in Cities; with Especial Reference to Denver.

Hon. Geo. T. Shaffer, Lansing, Michigan:—
Report of the Michigan State Land Office, 1891.

Dr. Charles S. Sheldon, Madison, Wis.:—
Transactions of the State Medical Society of Wisconsin, year 1891.

J. H. Shedd, C. E., Providence, R. I.:—
Annual Report of the City Engineer of Providence, R. I., year 1891.

Hon. T. C. Sherwood, Lansing, Michigan:—
Report of the Commissioner of Banking of Michigan, 1891.

W. J. Simpson, M. D., Calcutta, India:—
Report of the Health Officer of Calcutta for 1890.

Charles D. Smith, M. D., Portland, Maine:—
Transactions of the Maine Medical Association, Session of 1891.

John C. Smock, Trenton, N. J.:—
Annual Report of the State Geologist of the State of New Jersey, 1891.

M. Allen Starr, M. D., New York:—
Transactions of the New York Academy of Medicine. Instituted 1847. Vol. VII.

H. R. Storer, M. D., Newport, R. I.:—
Sanitary Protection Association, Newport, R. I. Report of Committee on Garbage and House Offal, etc.
The Newport Water Works: Its Excessive Charge and the Remedy.

Secretary of State, Lansing, Michigan:—
Local Acts of the Legislature of Michigan, passed at Regular Session of 1891, with appendix.
Annual Report of the Board of State Auditors for the State of Michigan for the year 1891.
Twenty-Second Registration Report, Michigan, Vital Statistics, 1888.

Secretary of Agriculture, Washington, D. C.:—
Bulletin No. 7, Agricultural Department,—Spraying Fruits for Insects and Fungous Diseases, with a special consideration of the subject in Relation to Public Health.
U. S. Agriculture Bulletin No. 13 relative to Foods and Food Adulterants.
U. S. Bulletin No. 1, Agricultural Department,—Additional Evidence on the Communicability of Peach Yellows and Peach Rosette.
Bulletin No. 8, Agricultural Department,—Results with Experiments with Inoculation for the Prevention of Hog Cholera.
Proceedings of the Eighth Annual Convention of Agricultural Chemists, at Washington, D. C., Aug. 13-15, 1891. Bulletin No. 30.
Instructions for Voluntary Observers for U. S. Weather Bureau.
Album of Agricultural Graphics.

Secretary of State, Washington, D. C.:—
Commercial Relations of the United States with Foreign Countries, 1888-1889.
Special Consular Reports.—Port Regulations in in Foreign Countries.
Index to Special Consular Reports, Vol. II.
Special Consular Reports.—India Rubber, Part I. and Part II.
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Reports from the Consuls of the United States, May, June, July, August, September, October, November, December, 1891, and January, February, March, April, 1892.
Special Consular Report.—Streets and Highways in Foreign Countries.

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G. Lane Taneyhill, Baltimore, Md.:—
Transactions of the Maryland Medical and Chirurgical Faculty, Ninety-Third Annual Session, Baltimore, April, 1891.

Public Library, Tokio, Japan:—
General Regulations relating to Local Education.
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Willis G. Tucker, M. D., Ph. D., Albany, N. Y.:—
Report of Willis G. Tucker, M. D., Ph. D., Analyst of Drugs. To the Secretary of the State Board of Health.
The Purification of Water by the Chemical Treatment.

Irving S. Upson, New Brunswick, N. J.:—
Annual Report of the State Geologist of New Jersey, 1890.

F. P. Venable, Chapell Hill, N. C.:—
Journal of the Elisha Mitchell Scientific Society, 1891, Part II.
Journal of the Elisha Mitchell Scientific Society, 1891.

Vermont State Board of Health, Rutland:—
Fifth Annual Report of the Secretary of the State Board of Health of the State of Vermont, for the year ending Sept. 1, 1891.

Horace G. Wadlin, Boston, Mass.:—
The Annual Statistics of Manufacturers of Massachusetts, 1890.
Twenty-first Annual Report of the Bureau of Statistics of Labor of Massachusetts, March, 1891.

George E. Waring, Jr., C. E., Newport, R. I.:—
Sewage Disposal for Isolated Houses and Large Institutions.
The Sewerage of Two New Hampshire Towns—Keene and Laconia.

R. C. Warne, M. D., Mitchell, S. D.:—
Proceedings of the South Dakota Medical Society, 1890-1891.

Irving A. Watson, M. D., Concord, N. H.:—
Tenth Annual Report of the State Board of Health of New Hampshire, 1891.

Alex. J. Wedderburn, Washington, D. C.:—
Bulletin No. 32, Agricultural Department.—Special Report on the Extract and Character of Food Adulterations, including State and other Laws relating to Foods and Beverages.

H. A. West, M. D., Galveston, Texas:—
Transactions of the Texas State Medical Association. Twenty-Third Annual Session held at Waco, Texas, April 28-May 1, 1891.

Hon. Edwin B. Winans, Lansing, Michigan:—
Report of the Committee of Inspection of the Michigan Military Academy at Orchard Lake, Michigan, for the year 1890.

U. O. B. Wingate, M. D., Milwaukee, Wis.:—
Third Annual Report of the Commissioner of Health of Milwaukee, April, 1891.

M. Anna Wood, Wellesley, Mass.:—
Statistical Tables Wellesley College Gymnasium.

N. E. Wordin, A. M., M. D., Bridgeport, Conn.:—
Proceedings of the Connecticut State Medical Society, 1891.

Frank W. Wright, M. D., New Haven, Conn.:—
Eighteenth Annual Report of the Board of Health of the City of New Haven, 1890.

Walter Wyman, M. D., Washington, D. C.:—
Weekly Abstracts of Sanitary Reports, year 1891.
Annual Report of the Supervising Surgeon General of the U. S. Marine Hospital Service. Year 1891.

Unknown:—
Discussion of the Medical Practice Bill.—Regulars vs. Quacks.

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BY PURCHASE.

Fifty-Second Annual Report of the Registrar-General of England, 1889.
Journal of the Scottish Meteorological Society. With Tables. Year 1889.
Influenza and Catarrhal Fever. By E. S. Thompson, M. D., F. R. S.
Scatalogic Rites of all Nations. By Capt. John G. Bourke.
The Genuine Works of Hippocrates. By Francis Adams, LL. D.
Vörlesungen über Specielle Pathologie un Therapie. By Dr. Liebermeister.
Bacteria and their Products. By Dr. G. Sims Woodhead.
Surgical Bacteriology. By N. Senn, M. D., Ph. D.

American Lancet, Detroit.
U. S. Official Postal Guide.
Scientific American and Supplement, N. Y.
American Jour. of Medical Sciences, Philadelphia.
Popular Science Monthly.
London Lancet.
Nature, London.
British Medical Journal, London.
Sanitarian, N. Y.
Sanitary Record, London.
Medical News, Philadelphia.
Sanitary Journal, Glasgow.
Science, New York.
American Meteorological Journal.
Archiv für Hygiene, Munich.
Centralblatt für Bakteriolgie and Parasitenkunde, Berlin.

ACCESSIONS BY EXCHANGE.

Received in exchange for publications of this Board (in some instances incomplete volumes):

Abstracts of U. S. Sanitary Reports, Washington, D. C.
American Exchange and Review, Philadelphia.
American Microscopical Journal, New York.
American Analyst, New York.
American Practitioner and News, Louisville.
Annals of Hygiene, Philadelphia.
Anti-Food Adulteration, Philadelphia.
Architecture and Building, New York.
Buffalo Medical Journal.
Bulletin de l'Academie Royale de Medicine.
Bulletin of the Cornell University.
" " " Florida State Board of Health.
" " " Iowa State Board of Health.
" " " North Carolina State Board of Health.
" " " Ontario Provincial Board of Health.
" " " Rhode Island State Board of Health.
" " " Tenn. State Board of Health.
" " " Ohio State Board of Health.
" " " Salford Board of Health, England.
Climatologist, Phila.
Canada Educational Monthly, Toronto.
Canada Lancet, Toronto.
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Cincinnati Lancet-Clinic.
Cleveland Medical Gazette.
College and Clinical Record, Phila.
Columbus Medical Journal.
Confectioners' Journal, Phila.
Dietetic Gazette, New York.
Engineering News, New York.
Good Health, Battle Creek.
Il Rosario e La Nuova Pompei Mensuale, Pompei.
Indicator, Detroit.
Jour. Comparative Medicine and Veterinary Archives, Phila.
Journal D'Hygiene, Paris.
Journal Franklin Institute, Phila.
Leonard's Illustrated Monthly, Detroit.
Manufacturer and Builder, New York.
Maryland Medical Journal, Baltimore.
Medical Age, Detroit.
Medical and Surgical Reporter, Phila.
Medical Brief.
Medical Bulletin, Phila.
Medical Standard, Toronto.
Memphis Medical Journal.
Metal Worker, New York.
Nashville Medical Journal.
National Druggist, St. Louis, Mo.
New York Medical Abstract.
North Carolina Medical Journal, Wilmington.
Northwestern Lancet, St. Paul.
Pharmaceutical Era, Detroit.
Physician and Surgeon, Ann Arbor.
Public Health in Minn., Red Wing.
Quarterly Returns of Births and Deaths of Ireland.
Reports of the New York City Board of Health.
Revista do Observatorio Societe Royal de Medicine, Rio de Janerio.
Revue de Bibliographie Internationale, Paris.
Sanitary Era, New York.
Sanitary Inspector, Augusta.
Sanitary News, Chicago.
Sei-i-kwai Medical Journal, Tokio, Japan.
Texas Sanitarian, Austin.
Veröffentlichungen des Kaiserlichen Gesundheitsamtes, Berlin.
Weekly Medical Review, St. Louis.

LOANS FROM THE LIBRARY.

Publications drawn out, and not yet returned to the library, are as follows:—

BY HENRY F. LYSTER, M. D., DETROIT.

House Drainage—Pamphlet Mass. State Board of Health.

BY ARTHUR HAZLEWOOD, M. D., GRAND RAPIDS.

Ten Years Compulsory Notification of Infectious Diseases in Edinburgh.
Parks Hygiene, Fifth Edition.
Annual Report of the Health Department of Baltimore, Md., 1889.
U. S. Abstract of Sanitary Reports, Vol. iv., No. 33, 1889.
The Sanitarian, Vol. 26, March, 1891.
The Sanitarian, Vol. 26, February, 1891.

BY GEO. E. WILLITTS, LANSING.

What can the State do to Prevent the Cholera—Cunningham.
Hecker's Epidemics of the Middle Ages.
Report of the Health Officer of Calcutta, year 1888.

BY EDWARD CAHILL, LANSING.

Science, Feb. 28, 1890.
Popular Science Monthly, Vol. 23, 1888.
Science, Vol. 7, 1886.
Science, Vol. 8, 1886.
British Medical Jour., Jan.-June, 1887.

BY C. C. YEMANS, M. D., DETROIT.

Report on Plan for Securing Records of Deaths—Elisha Harris, M. D.
Some Fallacies of Statistics—Rumsey.
Death-Rate of Each Sex in Michigan—Dr. Henry B. Baker.

BY JOHN AVERY, M. D., GREENVILLE.

Transactions of the American Public Health Assoc., Vols. iv., v., vi.
Schools, Prize Essay by A. N. Bell, M. D.

BY MRS. M. W. HOWARD, LANSING.

Popular Science Monthly, February, 1892.

BY PROF. G. J. KOLLEN, HOLLAND.

Parkes Hygiene.
Transactions of the Indiana State Medical Society.
Johnston's Chemistry of Common Life.
Steele's Hygienic Physiology.
Alcohol and Hygiene—Coleman.
Transactions of the New York State Medical Society.

BY ROBERT SMITH & CO., LANSING.

Medical Standard, Vols. 3-4, 1888.
Medical Counselor, Vol. 9, 1885.
Nashville Jour. of Medicine, Vol. 39, 1887.
Weekly Medical Review, Vol. 14, 1886.
Medical Age, Vol. 4, 1886.
Ohio Meteorological Reports, 1884.
Popular Science Monthly, Vol. 24, 1884.
Revue D'Hygiene, 1884.
Jour. Franklin Institute, Vol. 124, 1887.
American Microscopical Jour., Vol. 6, 1885.
Columbus Medical Jour., Vol. 1, 1883.
Centralblatt für Bakteriologie und Parasitenkunde, 1890.

BY EDWARD H. M'CALLUM, LANSING.

Bacteria and Their Products—Prudden.
Part 1. Congress La Tuberculosis, 1st. Session, Paris, 1888.
Part 2. Congress La Tuberculosis, 1st. Session, Paris, 1888.

BY HERMAN OSTRANDER, M. D., KALAMAZOO.

Sanitarian, Vol. 8, 1880.
Report of Rhode Island State Board of Health, 1881.
Report of Rhode Island State Board of Health, 1882.
Popular Science Monthly, Vol. 11, 1877.

BY WILL C. HUME, M. D., CORUNNA.

Three Communications relative to Rabies,—Paul Gibier, M. D.

BY DR. C. S. LOMBARD, NEGAUNEE.

Handbooks for Water Drinkers—G. L. Austin.
Trans. Sanitary Institute of Great Britain, Vol. 11, 1889-90.
Water Supply—William R. Nichols.
Sanitary Journal, Vol. 9.
Trans. Medical Society of State of New York, 1886.
Sanitary News, Vol. 12, 1888.
How to Study the Biology of a Water Supply—Geo. W. Rafter.
Report of Calcutta Health Society, 1886.
Jour. Health Society of Calcutta and Suburbs, June, 1885, Vol. 1, Part iv.

Jour. Health Society of Calcutta and Suburbs, 1886, Vol. 11, Part 1.
The Sanitary Value of Chemical Analyses of Potable Water—Tucker.
Sanitary Condition of Water Supplies—Edwin Chadwick.
Pure Water and How to Secure it? N. J. State Board of Health.
On the Determination of Nitrates in Potable Water.
Report on the Drinking Water of Towns, Cities and Villages of Maryland.
Preliminary Report to the Ill. State Board of Health on Water Supplies of Illinois and the Pollution of its Streams—Dr. Rauch.
The Tubular Wells of Lynn as a Source of Water Supply.
Water Pollution—Irving A. Watson, M. D.
Report on the Analysis of the Ohio River Water—Dr. Stuntz.
Report of Chief Engineer on the Condition of Water Works of Chicago.
Filtration and Purification of Water.
Water and the Water Supply of Wisconsin—Dr. Witter.
Sanitary Condition of the Water Supply of Lowell, Mass.

PAPER AND ENVELOPES.

The following table shows the amount and kind of hard paper there was on hand at the time of making the last report, the amount purchased during the year, the amount used, and the amount now on hand:—

Kind of Paper.	On hand at last Report.		Purchased since last Report.		Used during the fiscal Year.		On hand June 30, 1892.	
	Reams.	Sheets.	Reams.	Sheets.	Reams.	Sheets.	Reams.	Sheets.
Flat	3	242				322	2	400
Crown	1	42	20		13	60	7	462
Folio Post	19	355	30		38	343	11	12
Demy	4	164				244	3	400
Medium		391	3			52	3	339
Byron Weston		150						150
Fools Cap	1	150				150	1	
Legal Cap	1	240					1	240
Blotting paper		31		100		81		50
Blue Cover paper	2	210	13	216	4	456	10	450
Postoffice paper	1	240				40	1	200
Book paper	5					80	4	400
Manilla wrapping paper	4	330			1	70	3	260

There are now on hand 6,050 sheets of hard paper of half letter size, 138 sheets of note paper, and 1,550 sheets of one-half note size.

There were about 117,564 envelopes on hand at the time of making the last report; 34,000 of the various kinds used in the office have been purchased since, making a total of 151,564. There are now on hand 46,970 printed envelopes and 53,200 blank envelopes, making a total of 100,170. About 51,394 have been used in the work of the office.

DISPOSITION OF POSTAGE.

Vouchers for postage (for use in the office) have been allowed during the year to the amount of $1,337.00. The cost of postage during the fiscal year has been $1,337.00, as follows:

Distribution of Annual Reports	$196.58
General distribution of documents and circulars	417.46
Sending weekly and monthly bulletins	34.27

Collection and dissemination of statistics and information in regard to communicable and other diseases	$58.39
Sending meteorological material to observers	14.37
Mailing notices of possibly infected immigrants	6.20
Mailing supplies to card reporters, in connection with the collection of sickness statistics	14.75
Regular and special correspondence of the office, and all other postage (including a considerable amount for distribution of documents on the restriction of diphtheria, scarlet fever, and typhoid fever, to localities where those diseases occurred)	594.98
Total	$1,337.00

TOTAL AMOUNT AND CLASSIFICATION OF EXPENDITURES BY THE STATE BOARD OF HEALTH DURING THE FISCAL YEAR ENDING JUNE 30, 1892, AS PER VOUCHERS NUMBERS 2028 TO 2176, INCLUSIVE, EXCEPT NOS. 2161-2163.

Chemical analyses	$30.00
Engraving, drawing, etc.	2.10
Expenses of members:—	
Attending meetings	124.30
Other official	666.12
Instruments and books	134.39
Paper, stationery, etc.	443.59
Postage:—	
Office	1,337.00
Members	
Printing and binding	745.79
Secretary	2,500.00
Special investigations	
Miscellaneous	255.15
Expressage	26.15
Telegrams	9.18
Telephone	20.65
Total	$6,294.42

Respectfully submitted,

HENRY B. BAKER,
Secretary.

EXPENDITURES BY THE STATE BOARD OF HEALTH IN THE CALENDAR YEAR, 1891.

The foregoing is reported, in compliance with law, relative to the fiscal year. But the appropriations for the Board are for the calendar year, and they amount to six thousand dollars. The expenditures for any calendar year, therefore, cannot exceed six thousand dollars. The following is a classified statement of expenditures for the calendar year 1891:

CLASSIFIED STATEMENT OF EXPENDITURES BY THE BOARD DURING THE CALENDAR YEAR 1891.

Chemical analyses	$30.00
Engraving, drawing, etc.	2.10
Expenses of members:	
Attending meetings	99.60
Other official	659.62
Instruments and books	204.52
Paper, stationery, etc.	411.41
Postage:	
Office	1,050.00
Members	
Printing and binding	803.95
Secretary	2,500.00
Special investigations	
Miscellaneous	190.41
Expressage	9.85
Telegrams	7.97
Telephone	.40
Total	$5,999.83

EXPENDITURES ON ACCOUNT OF THE BOARD.

The appropriations ($6,000) at the disposal of the State Board of Health are for certain specified purposes, not including clerk hire, the publication of the Annual Report, or the expenses in the examination of plans for public buildings; these expenditures *on account of* but not by the Board are provided for by other acts of the legislature than those appropriating money to be expended by the Board, and the accounts are kept in other offices, not in the office of the Board of Health; the accounts for clerk hire are kept by the Auditor General, and reported in his Annual Report; the accounts for publication of the Annual Reports, and for expenses in the examinations of plans for public buildings, are kept by the Board of State Auditors, and are published in the Annual Report of that Board.

Respectfully submitted,

HENRY B. BAKER,
Secretary.

SANITARY CONVENTIONS.

THE MICHIGAN PLAN.*

BY PROFESSOR DELOS FALL, M. S., MEMBER STATE BOARD OF HEALTH, ALBION, MICHIGAN.

The influences which finally led up to the establishment of the Michigan State Board of Health had a beginning somewhere in the brain and heart of some liberal minded citizen, one whose broad and sympathetic spirit caused him to plan large things for his race. Preventive medicine was very little thought of in those days. The physician's duties were comprised in the one line of curing the sick, rather than preventing them from becoming so. Sickness is the inevitable lot of man, they said, and the physician is needed to ease the pain and restore to health, or if perchance it be that last sickness, which is unto death, his ministrations would make easier the dying hours. This was the creed of less than a generation ago.

But some one thought differently, and that some one influenced others, until finally, by petition and memorial, by personal influence with Legislators, and in other ways, in 1873 the law was passed, which established the Michigan State Board of Health.

Section two of the act establishing the Board, defined its duties, provided for the election of a secretary and executive officer and defined his duties.

Prior to this, however, the work which such a board ought to do, had been defined by the man who became its first secretary, and who, we are glad to say, still serves us with signal ability. He had already been engaged in public health work, and as Superintendent of Vital Statistics, had commenced the work of gathering, tabulating, and preserving the statistics of sickness for the State. He had been a soldier, and as such had been observant of the great destruction of human life by the ravages of war. Returning to the life of a civilian, and having been brought face to face with death's doings, with the ravages of disease, and at the same time possessing a true scientific instinct by which he quickly connected cause and effect, he declared that "grander victories of greater importance to the people remain to be achieved than any which have heretofore resulted from war-

* Read before the National Conference of State Boards of Health, at Lansing, June 6, 1892.

like methods. To the peaceful hero who shall call forth and so marshal facts and generalize the scattered forces of knowledge as to lead to a victory over any one of the prominent causes of death which now annually destroy our citizens by hundreds or by thousands, humanity may well accord a higher praise than to the most successful of warlike generals."

Section 2 of the act establishing the Board says: "The State Board of Health shall have the general supervision of the interests of the health and life of the citizens of this State. They shall especially study the vital statistics of this State, and endeavor to make intelligent and profitable use of the collected records of deaths and of sickness among the people; they shall make sanitary investigations and inquiries respecting the cause of disease, and especially of epidemics; the causes of mortality, and the effects of localities, employments, conditions, ingesta, habits and circumstances on the health of the people. They shall, when required, or when they deem it best, advise officers of the government, or other State Boards, in regard to the location, drainage, water supply, disposal of excreta, heating, and ventilation of any public institution or building."

Section 5 of the same law defines the duties of the Secretary, and, among other things, it requires that "he shall collect information concerning vital statistics, knowledge respecting diseases, and all useful information on the subject of hygiene, and through an annual report, and otherwise, as the board may direct, shall disseminate such information among the people." The simple phrase "and otherwise," is perhaps the only sanction which that act gives to the holding of sanitary conventions.*

The first recorded address made before the Board is worthy of repetition here as showing how early the members grasped the true idea of the nature of their work and the best methods of carrying it out.

Dr. Homer O. Hitchcock was temporary chairman of the first meeting of the Board held in Lansing, July 30, 1873. He gave a short introductory address outlining the prospective labors of the Board. Among other things, he declared the work of the Board to be "the making a State Board of Health popular with, because useful to, the people of the State; to educate the people in respect to the nature and causation of diseases and the means for their prevention." "We must be ready," he said, "to point out the influence of the topography, geology and climate of the various parts of our State upon the health of its citizens; the importance and intimate relation of drainage and sewerage to the health of families and whole communities; to call the attention of the people to the influence of various kinds of occupations, food, drink and clothing, as well as the structure of their public and private buildings upon the development of certain forms of disease; and most especially to point out the vast importance to the welfare and perpetuity of the State of properly rearing, training and educating the young; and to point out the nature and causes of epidemics, endemics and contagious diseases, and the means for their prevention or eradication."

The work of the Board was therefore of a two-fold nature, viz.: (1) To collect information and (2) to disseminate it among the people.

To this line of work the Board has held itself steadfast during the almost nineteen years of its existence.

How may the people best be reached; how shall the information gathered by the Board be brought before their attention? These questions have

*But Act 241, Laws of 1881, made an appropriation for this purpose.

received various answers. At first the Board sought to do its work by sending out circulars, and their annual reports. They were sent largely to health officers and not directly to the people.

These circulars were very emphatic in their utterances; one, for example, sent out in 1874, contained specific directions for the restriction and prevention of small-pox. In the same circular are these words: "Scarlet fever is a contagious or infectious disease, and as such requires the same means of prevention as small-pox (except vaccination), including 'isolation of the infected person, absolute quarantine of the household or hospital where the diseased person is lying, cleanliness, ventilation,' and all the methods of disinfection hereinafter enumerated in connection with the disinfection of excreta from the infected, the disinfection of clothing, bedding, furniture and rooms, and also fumigation. When scarlet fever exists in a community the preventive means should be applied with the same energy and perseverence as is done during the prevalence of small-pox." The circular further said: "The number of deaths in Michigan during the year 1870 from small-pox was nine (9); from scarlet fever, eight hundred and fifty-two (852). If it is worth while to attempt to decrease the number of deaths from small-pox below nine (9) a year, is it not an imperative duty to reduce the number of deaths from scarlet fever from 852 a year to a number that will, in a measure, approximate that of deaths from other contagious and infectious diseases?" Average death-rate from 1878 to 1889, inclusive, was 386; in 1889, 240.

But these circulars did not reach the people, and if they did, they lost much of their forcefulness. The influence exerted and the interest aroused by them could not be compared to that produced by the uttering of the same truth directly to the people by word of mouth.

This thought seems to have been the inspiration which came to our veteran sanitarian, Prof. R. C. Kedzie. In his annual address for 1878, as President of the State Board of Health, he proposed the holding of sanitary conventions in different parts of the State, to consider and discuss sanitary matters. A committee was immediately appointed to consider the best means of inaugurating such sanitary conventions.

It was thought best that each of the conventions should be held by the joint action of the State Board of Health and a committee of citizens of the place where the convention should meet. At the April, 1879, meeting the Board voted to hold two such meetings, the first in the city of Detroit and the second in the city of Grand Rapids, on condition that the people of the places named would defray the local expenses of the conventions; also that certain influential gentlemen should be invited to take part in the way of addresses and papers and that manufacturers and dealers in sanitary appliances be invited, at their own expense, to forward their goods for exhibition. It may be said that the latter feature was carried out and a number of sanitary appliances were exhibited and reported upon. It was soon discontinued, however, probably because those dealing in these articles made an unfair use of any good words which the Board or prominent sanitarians might say of them by way of advertising.

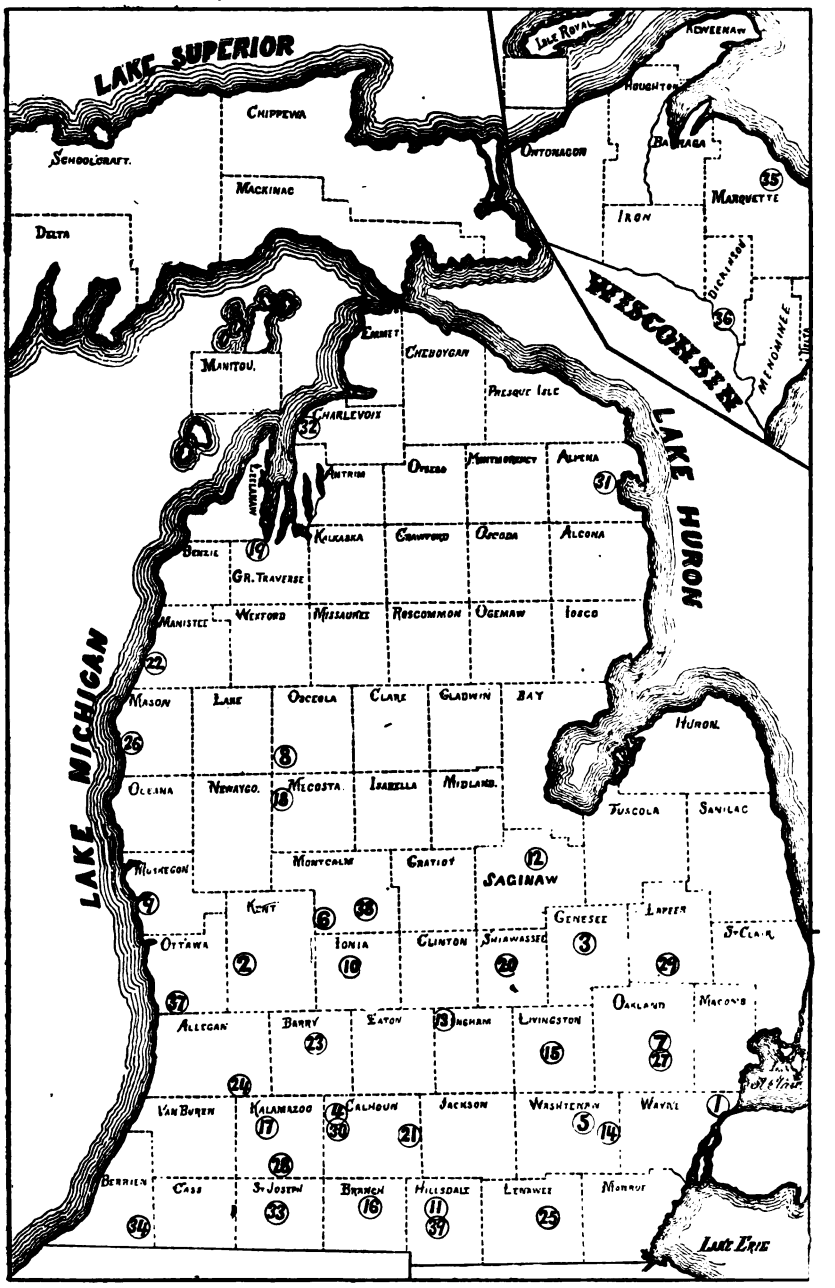
These two conventions were held and proved to be very successful.

As Dr. C. C. Yemans, Secretary of the Detroit Convention, said in his official report, "all in attendance were well pleased with the session of the first sanitary convention and regarded the work done as equal to the anticipations of its most enthusiastic friends."

Thirty-seven such conventions have been held in different parts of the

SANITARY CONVENTIONS IN MICHICAN.

THE FIGURES ①,②,③,TO ㉟ INCLUSIVE INDICATE THE SEVERAL LOCALITIES.



①,②,③, ETC., INDICATE THE ORDER OF OCCURRENCE OF THE CONVENTIONS. THE NAMES OF THE CITIES WHERE THESE CONVENTIONS WERE HELD, AND THE DATES OF THEIR OCCURRENCE, ARE STATED ON THE PAGE PRECEDING OR FOLLOWING THIS.

State. The accompanying map shows how thoroughly the State has been covered by these meetings. From the first meeting held in the metropolis and the second held in the second city, the convention has gone into other places, nearly all principal places having been visited as well as many smaller ones. Our audiences are almost always large and always enthusiastic. The people are eager to learn and ready to practice when they have been convinced of the best way of producing sanitary reforms.

That great good has been accomplished there can be no doubt. In a number of cases the convention has been followed by improvements in the water supply, water-works have been built, sewer system established, better methods of disposing of waste and excreta have been adopted, a better support given to the health officers, nuisances have been abated, and many other public reforms have been the legitimate outcome of a sanitary convention. Added to these public benefits are those coming to the hundreds of householders who have heeded a personal appeal made to them and have entered upon reforms in domestic sanitation which have been productive of great good.

The writer of this paper considers that his task has been accomplished when he has told in the briefest way the method of procedure by which one of these conventions is planned and carried out. The various steps in the process are given in the order which characterizes the conduct of every convention. First, then, the initial step is never taken by the State Board of Health. That is taken by some person of the place who, for one reason or another, thinks it desirable that a convention should be held there. That person interests the public in the project enough to obtain the signatures of prominent citizens, the Mayor and Council, the clergy, members of the medical fraternity, lawyers, teachers and others, to a petition which merely recites the desire to have the convention, others give the reasons. One city asks it because an epidemic of diphtheria is prevailing, another because of a poor water supply causing typhoid fever, another because the Common Council have abolished themselves by formally abolishing the local Board of Health, etc., etc. One appeal will be given in full.

This petition shows one feature that is unique, viz.: It is the only one the expenses of which have been borne by the citizens of the place.

This convention was held in compliance with an invitation from the Mayor and Council and citizens of Iron Mountain, as follows:

Iron Mountain, Mich., Oct. 6, 1891.

Henry B. Baker, M. D., Secretary State Board of Health, Lansing, Mich.:

DEAR SIR:—We have been having a rate of death in this city from typhoid fever that is simply awful. This sickness has become so serious that the City Council recognized the fact that something had to be done to get the State Board of Health to come here immediately. And on last Monday night they appropriated the sum of $250 to defray the expenses of your Board. As the cold weather sets in so early here it would be advisable for the Board to come immediately.

Rev. A. E. Cook, who has written to you in regard to this matter, will forward to you the necessary petition, and as the City Council will defray your expenses, I know and hope you will do everything in your power to help us in this matter.

Please come immediately and assist to save the lives of the balance of the citizens.

Yours truly,

F. J. TRUDELL, *Mayor.*

Memorial from Citizens of Iron Mountain, for a Sanitary Convention.

Iron Mountain, Mich., October 2, 1891.

To the Honorable the State Board of Health, Lansing, Mich.:

GENTLEMEN:—The undersigned citizens of Iron Mountain, Mich., believing that the public discussion of questions relating to the public health, under the auspices of the State Board of Health, would result in great benefit to our city, hereby respectfully petition that a Sanitary Convention may be held in Iron Mountain, under the direction and with the coöperation of your Board, or a committee thereof, at such a date prior to Nov. 14 as you may be pleased to select. (Signed by 35 citizens.)

These invitations are accepted by the Board, and, as far as is practicable, the conventions are held in the order in which the invitations have been received. A committee of the Board is appointed to visit the place and confer with a like committee of the citizens which in the meantime has been appointed at a public meeting held for that purpose.

At the joint meeting of these committees all the details of the convention are worked out; the time of holding the convention, number of sessions, place of meeting, subjects to be discussed, etc., etc.

The permanent officers of the convention are chosen, a President, a number of Vice-Presidents, a Secretary, an Executive Committee, Reception Committee, and Music Committee. At this same meeting persons are chosen to prepare papers upon the subjects assigned. Usually the papers are prepared by local persons, enlisting for this purpose those prominent in all walks in life, lawyers, physicians, teachers, preachers, editors, engineers, politicians. Some one is also appointed to lead in the discussion which follows; very often some member of the State Board. Sometimes this order is reversed, a member of the State Board preparing a paper and some one else leading the discussion.

And now, if the convention is to prove a success, much preliminary work must be done, and for this the Secretary will be largely responsible. That he will be a good man for this work has been considered before he was appointed to this office. The State Board prints preliminary notices and the same number of envelopes with the date of the convention and the Secretary's name printed upon them. With these the Board also sends five dollars' worth of postage. These notices are sent by the Secretary to prominent people in the adjacent cities and towns, and in many cases a personal letter is written giving a special invitation to attend. The Secretary follows up the persons appointed to prepare papers, he looks after the Music Committee, he sees that the Executive Committee does its work, leasing the hall for the conventions, etc.; he inserts notices in all papers of his own and surrounding towns; in short, he is instant in season and out of season, to see that no part of the work is neglected. Care should also be exercised in the choice of a person for the President of the convention, one who will be familiar with the proper proceedings of a deliberative body and who will see that the program is carried out promptly and unnecessary and tedious discussions cut off. When the time draws near the program is formally made out and is printed by the State Board.

The members of this Conference are all doubtless familiar with these programs; if not, they can be supplied with sample copies.

What may be called the evolution of the convention program is an interesting study. The early programs contained such subjects as "Forests and Trees as Sanitary Factors," "Training Schools of Cookery," "Cosmetics,"

"Texas Cattle Disease," etc. These are good subjects, but they do not bear directly on those conditions by which lives are lost; they are a long way subordinate to the study of the restriction and prevention of dangerous communicable diseases; to do justice to that first program, however, it ought to be stated that it contained one paper on "The Limitation of Pulmonary Consumption," which, in the light of recent advances concerning that disease, seems almost prophetic, and a paper in the second program on "General Sanitation—its importance to the public welfare and a plea for better methods" was in many respects far in advance of the time for which it was written. Our later conventions, however, have been given largely to the education of the people regarding the germs of disease, how they are studied, how they develop, how diseases are communicated, how managed, restricted, prevented.

The discussion of the water supply, for example, has for its purpose to show the relation which that water may have to certain micro-organisms which are capable of living in it and producing disease.

A proper system of sewerage is urged because it diminishes the chances for the spread of disease germs.

The proper disposal of waste and excreta is discussed because in these forms of decaying organic matter is recognized one of the most dangerous possibilities of the spread of a communicable disease.

In discussing the abatement of nuisances in general our plan is always to call attention to the fact that the greatest nuisances, the ones most to be dreaded, those which must be removed at whatever cost of time or trouble, are those forms of infected matter which are capable of producing disease and death.

In a word, the program turns about a center composed of those communicable diseases which are the causes of the greatest mortality.

The sessions of the convention are four or five in number. The first one is usually at two or three o'clock in the afternoon, a second in the evening of the same day. If the number of papers to be presented and the interest of the people warrant it, a session is held in the forenoon of the second day. If not, a session is held in the afternoon and a closing session in the evening.

Of course it must necessarily be, in these efforts to secure the coöperation of the general public in sanitary matters, that all scientific nomenclature is dispensed with and while the truth is accurately told it is clothed in popular language, the language of the people rather than that of the scientist. As one has put it, "Here statistics become charged with the enthusiasm of the speaker, the inattentive become attentive and the blind begin to see." Following the presentation and discussion of a special subject, the circulars issued by the State Board bearing on that subject are distributed among the audience, and when the proceedings are published several hundred copies of the entire convention number are sent to be distributed among those interested.

As a layman, I may be permitted right here to record my high appreciation of the hearty support given these conventions by the resident members of the medical fraternity. They have been foremost in the work of bringing about reforms which are designed to reduce sickness and death to the minimum. Self-interest, the duty which compels all to look after one's own interest, is a "first law of nature" and physicians are not exempt from it, but in the majority of cases they are the pioneers in the work of reform; they are the educators through whose teachings the people learn the art of

preventing disease and prolonging life. On the other hand, the convention has not been without its reflex influence on the physicians themselves. They appeared more largely than any other class on the programs, and the people hear, for the first time, their own family physician, it may be, uttering sentiments which are convincing truths to them that he is governed in his practice by the principles of preventive medicine rather than a mere desire to cure from sickness. Their confidence in him is thereby strengthened and his practice benefited accordingly.

Concerning the publication of the papers presented at these conventions, it should be said that they are carefully edited before being published, all errors are corrected as far as possible, all irrelevant matter pruned out, etc., etc. A rule very early adopted by the Board is strictly adhered to. It is as follows: "*Resolved*, That no papers shall be published in the annual report of this Board except such as are ordered or approved for purposes of such publication by a majority of the members of the Board; and that any such paper shall be published over the signature of the writer, who is entitled to the credit of the production as well as responsible for the statement of facts and opinions expressed therein." At the present time it is usual to print two thousand copies of the proceedings. The aggregate of printing done for the thirty-seven conventions has included about 55,500 announcements and invitations, 66,600 programs and 74,000 copies of the proceedings; that is at the average rate of 1,500 announcements, 1,800 programs and 2,000 proceedings for each convention.

What does a sanitary convention cost? The answer given to that question depends upon how thorough you make the work of instruction of the people. The mere expense of holding the convention is comparatively small, but if the proceedings are published for distribution among the people the expense is doubled. The plan followed by our Board is as follows: The citizens of the place in which the convention is held provide a hall in which to hold the meeting, pay expenses of heating, lighting, janitor, etc., pay any necessary expenses for local advertising, for music and the like. They do not generally entertain the members of the Board who attend. The Board assumes the expenses of the members, hotel and traveling, the printing of invitations, programs and proceedings, postage for the Secretary, etc.

The following schedule shows in detail the expenses incurred by the four conventions held in the year 1890. Those held in Alpena and Charlevoix were in distant parts of the State, making the traveling expenses of members correspondingly heavy.

Expenditures on Account of the Four Sanitary Conventions, held under the auspices of the Michigan State Board of Health, during the calendar year 1890:

COST ON ACCOUNT OF THE LAPEER CONVENTION.

Printing announcements and ruling note	$4 03
Printing programs	6 23
Composition and press work of Proceedings	59 10
Corrections on the same	1 80
Covers for the Proceedings	4 80
Folding, stitching and covering	6 00
Postage to the Secretary of the Convention	5 00

Reprint No. 333 (making over form, press work, binding)	$1 70
Reprint No. 334 (making over form, press work, binding)	1 80
Reprint No. 335 (making over form, press work, binding)	3 60
Reprint No. 336 (making over form, press work, binding)	1 35
Covers to reprint No. 334	30
Printing envelopes for use of Secretary of Convention	45
A. A. Clark	47 51
John Avery, M. D	12 31
H. F. Lyster, M. D	5 50
Delos Fall, M. S	14 45
H. B. Baker, M. D. (expenses in making arrangements)	5 01
H. B. Baker, M. D. (expenses in attending the convention)	7 96
Postage for announcements sent out	6 55
Postage for programs sent out	6 16
Envelopes used sending announcements and programs	2 03
Total	$203 64

COST ON ACCOUNT OF THE ALPENA CONVENTION.

Printing announcements and ruling note	$2 93
Printing programs	5 75
Printing envelopes for use of Secretary of Convention	45
Composition and press work on Proceedings	63 91
Correction of the proof of the Proceedings	4 80
Covers for the Proceedings	4 80
Folding, stitching, binding Proceedings	6 00
Reprint No. 343 (making over form, press work, binding)	1 90
Reprint No. 344 (making over form, press work, binding)	1 50
Reprint No. 345 (making over form, press work, binding)	1 50
Reprint No. 346 (making over form, press work, binding)	1 70
Postage for Secretary of Convention	5 00
A. A. Clark	61 75
H. F. Lyster	25 00
Delos Fall	25 50
H. B. Baker (making arrangements)	17 22
H. B. Baker (attending the Convention)	21 50
Postage for announcements sent out	6 30
Postage for programs sent out	6 40
Envelopes used in sending out programs and announcements	2 03
Total	$265 94

COST ON ACCOUNT OF THE BATTLE CREEK CONVENTION.

Printing announcements, ruling note	$2 68
Printing programs	6 95
Printing envelopes for use of Secretary of Convention	45
Composition and press work of Proceedings	45 08
Covers to Proceedings	4 80
Folding and stitching, covering Proceedings	6 00
Reprint No. 337 (making over form, press work, binding)	1 55

Reprint No. 339 (making over form, press work, binding)	$1 55
Reprint No. 340 (making over form, press work, binding)	1 70
Reprint No. 341 (making over form, press work, binding)	1 70
Postage for Secretary of Convention	5 00
A. A. Clark	46 95
John Avery	11 00
H. F. Lyster	12 40
Delos Fall	3 50
H. B. Baker (attending the Convention)	8 72
Postage on programs sent out	6 25
Postage on announcements sent out	5 20
Envelopes used in sending out programs and announcements	1 83
Total	$173 31

COST ON ACCOUNT OF THE CHARLEVOIX CONVENTION.

Printing announcements, ruling note	$2 98
Printing programs	6 25
Printing envelopes for use by Secretary of Convention	45
Composition and press work on Proceedings	36 31
Covers for the Proceedings	4 80
Folding, stitching, covering Proceedings	6 20
Reprint No. 349 (making over form, press work, binding)	1 70
Reprint No. 350 (making over form, press work, binding)	1 35
Postage for Secretary of Convention	5 00
John Avery	20 50
Arthur Hazlewood	23 90
J. H. Kellogg	17 95
V. C. Vaughan	24 60
H. B. Baker (making arrangements)	17 23
H. B. Baker (attending the Convention)	20 05
Postage for programs sent out	7 00
Postage for announcements sent out	6 75
Envelopes used in sending out programs and announcements	2 20
Charlevoix	$205 22
Battle Creek	173 31
Alpena	265 94
Lapeer	203 64
Average	$212 03

It remains to make mention of the part taken by the members of the State Board of Health in these conventions. Very much of their success is due to the loyal support given them by all the members, often at a great sacrifice of time and labor. The Secretary has been present at every session of every convention, and four or five of the members have also been in attendance at each convention.

A study of the program shows that the names of members appear either for papers, addresses or discussions in the aggregate 225 times, or an average of over six such exercises for each meeting.

The announcement that at each session a prominent sanitarian will be heard goes very far toward attracting large audiences and insuring a successful meeting.

I will say in closing that this paper has not been written with a view to defend the sanitary convention. It needs no defense. Each one has been its own justification, as the people are constantly testifying. It is a settled policy with our Board, and the coming years will see the number of such conventions larger rather than smaller.

THE MICHIGAN PLAN FOR THE RESTRICTION AND PREVENTION OF THE DANGEROUS COMMUNICABLE DISEASES*.

BY HENRY B. BAKER, M. D., SECRETARY OF THE MICHIGAN STATE BOARD OF HEALTH, LANSING, MICHIGAN.

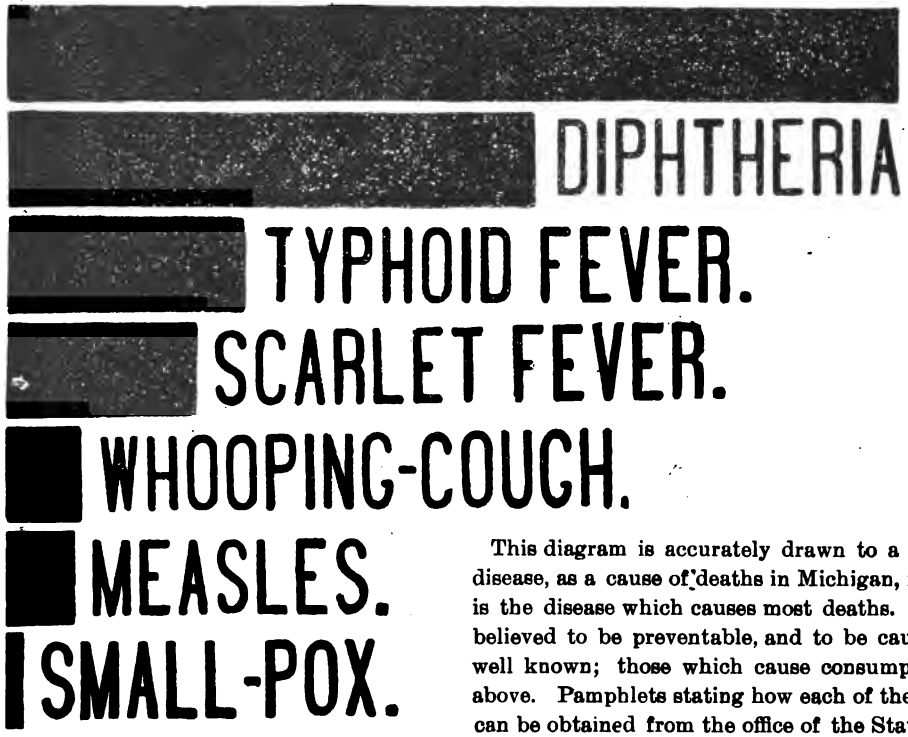
In Michigan, the State Board of Health has studied the vital statistics of the State, to learn what are the most important causes of death, with a view of expending most of its energies in directions of most importance. The Board has learned that the diseases which cause most deaths, arranged in the order of their importance are: Consumption, diphtheria, pneumonia, typhoid fever and scarlet fever. A diagram graphically exhibiting the relative importance of these diseases is printed on page cxxx.

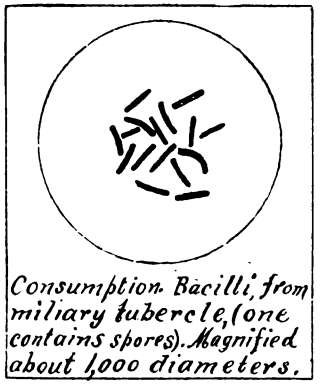
According to the best information which I can obtain, these diseases are all communicable diseases, and all are preventable, with the knowledge now possessed by leading sanitarians. But when this Board began its work the knowledge then possessed was not sufficient for the prevention of some of these diseases, and because of the prevailing ignorance among the people, it was not practicable to deal with all the diseases concerning which the methods of prevention were known to the Board. A beginning was made on a few diseases, concerning which the Board considered that it was practicable to educate the people generally.

Small-pox was generally known to be a contagious disease, and the Board at once labored assiduously to educate the people into a knowledge of its prevention by vaccination and revaccination, and its restriction by isolation and disinfection. The result of that work by the Board has been investigated. Comparing the death-rate in Michigan from small-pox, before and since the State Board of Health was established, it was found that if the death-rate had remained as it was before the Board was established, more than one thousand five hundred (1,554) persons would have died of

* Read before the National Conference of State Boards of Health, at Lansing, June 6, 1892.

DEATHS IN MICHIGAN, 1876-'87.





Consumption. Bacilli, from miliary tubercle, (one contains spores). Magnified about 1,000 diameters.

This diagram is accurately drawn to a scale, and the *relative importance* of each disease, as a cause of deaths in Michigan, is, therefore, correctly shown. Consumption is the disease which causes most deaths. All the diseases mentioned on this page are believed to be preventable, and to be caused by micro-organisms, some of which are well known; those which cause consumption are represented in the circular space above. Pamphlets stating how each of these diseases may be restricted and prevented, can be obtained from the office of the State Board of Health at Lansing.

small-pox more than have died of that disease. This was true at the close of the year 1887; and since that time the saving of life has been even more apparent.

Scarlet fever was one of the first diseases which the Michigan State Board of Health endeavored to restrict. The Board issued pamphlets, giving plain directions how to restrict scarlet fever.

These pamphlets were for general distribution; but the most important method adopted by the Michigan State Board of Health, for the education of the people of the State, is the method for the distribution of the pamphlets, leaflets and diagrams relating to the restriction and prevention of the several dangerous communicable diseases.

The method is as follows: The law requires householders and physicians to report to either the president, clerk or health officer of the local board of health, every case of a disease dangerous to the public health. The law requires the health officer to report to the Secretary of the State Board of Health, and to keep him constantly informed relative to every outbreak of such disease. In addition to this official source of information the local columns of newspapers published throughout the State are scanned at the office of the State Board of Health for mention of diseases dangerous to the public health; this supplies information concerning those parts of the State in which the health laws are not well obeyed. As soon as information is received by the Secretary of the State Board of Health of the occurrence of a case of dangerous communicable disease in any township, city or village in Michigan, action is at once taken; record is made in a book relating to that particular disease, directions are sent to the health officer as to the restriction of the disease, and as to his reports to the State Board; and pamphlets issued by the State Board, giving instructions for the restriction of the disease reported, are sent to him, with the request that the pamphlets be distributed to the neighbors of the family in which the disease is. It is found that at such times as a dangerous communicable disease is actually in the neighborhood people will read and pay attention to brief pamphlets issued by authority of the State.

Self-interest tends to make such people believers in the statements then and thus presented to them. This method is now, and for many years has been constantly acted upon, until now the citizens of nearly every township, city and village in Michigan have had an opportunity for such instructions at a time of more or less danger from each of the most dangerous communicable diseases which the State Board has thus dealt with, namely, small-pox, diphtheria, scarlet fever and typhoid fever.

One result has been the lessening of the ravages of each of these diseases. This is proved by the statistics of deaths collected by the Secretary of State; it is proved also by the statistics of sickness collected and applied by the State Board of Health. (I will refer to this subject again later.)

Another result has been a gradually increasing confidence in the State Board of Health, which promises much for its usefulness in connection with other dangerous diseases, one of which (consumption) is of more consequence than any which has been dealt with.

Probably the most important result, however, is the enlightened public sentiment of the people of Michigan with reference to those dangerous diseases concerning which the State Board of Health has thus been so constantly educating the people. That public sentiment now, in very many localities in Michigan, will sustain and uphold a health officer in effective

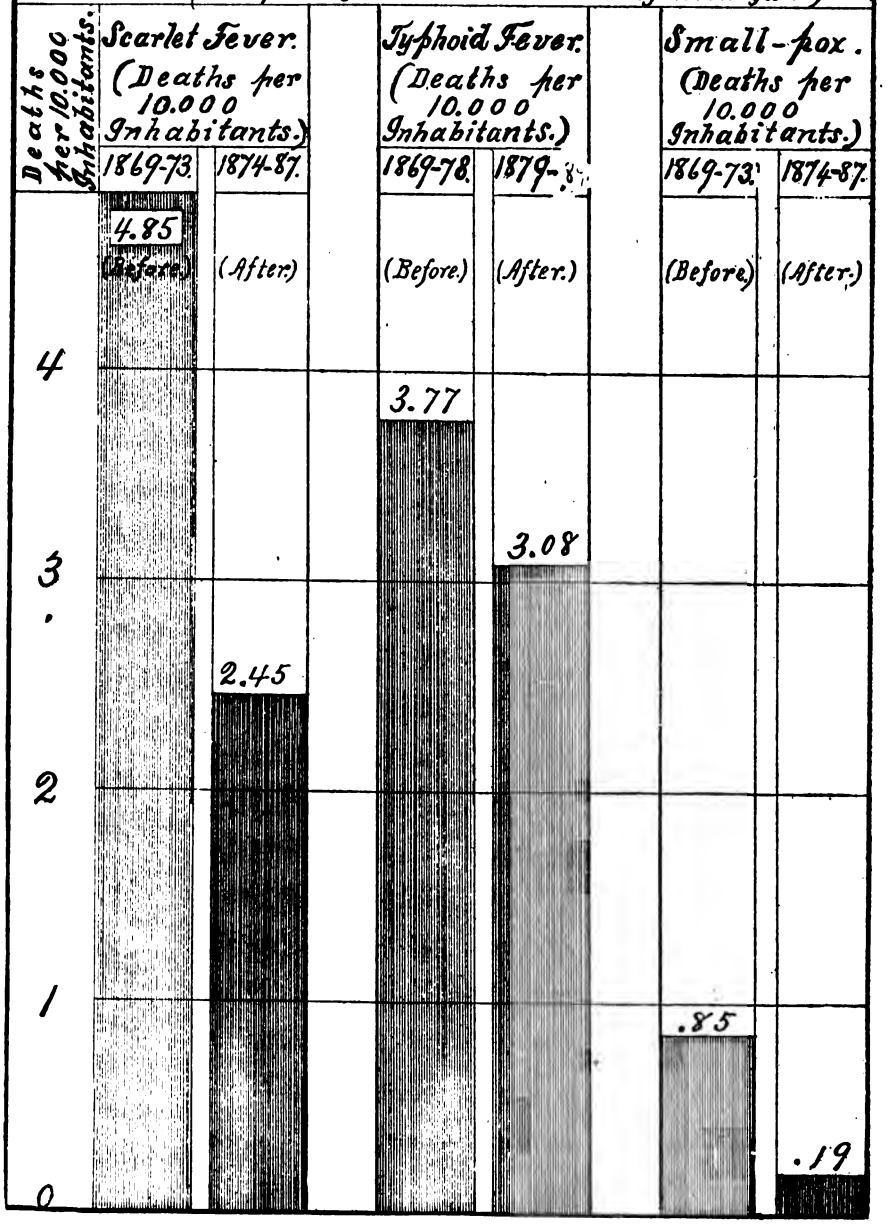
sanitary measures which, without that public sentiment, could not be entered upon with any prospect of success.

There can be no doubt on this subject; we have the positive evidence of it in many places where the plans of the State Board of Health have been adopted; and we have positive evidence of the absence of such public sentiment in localities where the plans of the State Board of Health have been rejected. Thus, the city of Detroit contains about one-tenth of the inhabitants of Michigan, and, although the Board of Health in Detroit was created through the influence of the State Board of Health, its health officers have always antagonized the efforts of the State Board; and the very important plan of the State Board for the gradual building up of public sentiment relative to the restriction of the dangerous communicable diseases has been rejected by the Detroit health authorities. They distribute a pamphlet, but it does not carry with it the authority of the State Board of Health, and it is given to the family in which the disease is; but it is not systematically distributed to the neighbors of that family. The result is that those dangerous communicable diseases which are of most consequence are not much restricted in Detroit; and it is claimed by the health officer that it is not possible to restrict them, because public sentiment will not sustain the measures which should be enforced by the local health officer; and the people generally will not so coöperate as to make it possible to restrict scarlet fever, and especially not diphtheria, concerning which the people have not been educated to a knowledge of its being strictly a communicable disease. The health officer estimates that it would cost nearly a million of dollars annually to restrict those two diseases in accordance with the plan of the State Board of Health, as set forth in its published pamphlets and documents. If his estimate is correct, it indicates something of the value of the systematic work on the plan of the State Board of Health, and of the cost of the rejection of that plan; because if that work had been done in Detroit, as it has been done in some other parts of the State, nearly that entire million of dollars annually could be saved and also most of the sickness and very many deaths could be prevented; because the citizens of Detroit are not very different from the citizens of other parts of Michigan, and do not contain so large a proportion of ignorant foreigners as do some other parts of the State in which success has been reached by the plan of the State Board of Health, which includes the publishing of the several pamphlets issued by the Board, not only in the English language but also in different foreign languages, and the distribution of the information relative to each disease at the time the disease is actually present in the neighborhood.

Not every other place besides Detroit has adopted the plans of the State Board of Health, yet enough have done so to bring down the death-rate from diphtheria and scarlet fever below those in Detroit. This is especially so relative to diphtheria. For the year 1890 the reported deaths from scarlet fever, in Detroit, were 2 per 10,000 inhabitants, while outside of Detroit the deaths in the State were 1.6 per 10,000 inhabitants, excluding the inhabitants of those localities in which scarlet fever did not occur, or, at least, was not reported. For the same year the reported deaths from diphtheria, in Detroit, were 17 per 10,000 inhabitants, while outside of Detroit they were only 9.3 per 10,000 inhabitants, counting only the inhabitants of localities in which diphtheria actually occurred and was reported.

DISEASES RESTRICTED BY PUBLIC HEALTH WORK.

Diagram .. Exhibiting the comparative mortality in Michigan from Scarlet Fever and Small-pox before and after the establishment of the State Board of Health, and of Typhoid Fever before and after the State Board undertook its restriction. (Compiled from Vital Statistics of Michigan.)



If the inhabitants of the whole State were counted in, the difference between the death rate in Detroit and in the rest of the State would be very much greater than is here shown.

Of the great usefulness of the plans of the State Board of Health, for the restriction of the dangerous diseases, we have abundant proof, and some of the evidence is of the nature of mathematical demonstrations.*

Thus, a study of the vital statistics of Michigan proves that, comparing the death rate, throughout the State as a whole, from scarlet fever, before the State Board of Health was established, with the rate since its establishment, up to the close of the year 1887, over five thousand six hundred persons have lived who, under the old mortality rate, would have died of scarlet fever. This is an average saving of four hundred lives per year from that one disease, scarlet fever.

A similar comparison of the death rates throughout the entire State, from typhoid fever, before and since the State Board has been dealing with that disease, proves that during the first period (1869–78), the rate was 37.71 per 100,000 inhabitants, while during the latter period it was only 30.87 per 100,000, a saving of 6.84 lives per 100,000 inhabitants per year, or 1,359 lives during the eleven years since this work was begun. It is very apparent that the saving of life, and the still greater prevention of sickness, is not only greatest in the latest years, when the numbers of inhabitants are greatest, but such education of the people as has been started by the State Board of Health, when it has once been fairly inaugurated, tends constantly to spread, so that the influences already exerted by the State Board will continue through all coming time to have their beneficial effect.

SICKNESS STATISTICS.

REPORT OF THE COMMITTEE ON VITAL STATISTICS.†

BY HENRY B. BAKER, M. D., SECRETARY OF THE MICHIGAN STATE BOARD OF HEALTH, LANSING.

For many years, leading statisticians lamented the absence of, hoped for, commended, and labored for the creation of statistics of sickness. Statistics relative to mortality are useful, and have supplied important bases for sanitary work and progress; but mortality statistics come too late for the greatest immediate usefulness by practical sanitarians engaged in restricting dangerous diseases. They are also too distant from the conditions which caused the disease to be most useful in studying the causation of diseases. The exceeding great expense attending the reporting of *all* sickness has, always, thus far, prevented the attempt, except in the case of armies, navies, etc., where such requirements can be enforced.

*A diagram entitled "Diseases Restricted by Public Health Work," graphically illustrates some of this evidence. It is printed on page cxxxiii.

†Read before the National Conference of State Boards of Health, at Lansing, June 6, 1892.

To Benjamin Ward Richardson, M. D., LL. D., one of the leading Medical and Sanitary minds in Great Britain, should be given the credit for the invention of a method of obtaining valuable sickness statistics without the immense expense involved in collecting records of *all* sickness. His plan was to have a considerable number of representative medical practitioners in active general practice report regularly to a central office, the reports to be there compiled. He inaugurated this system, and maintained it long enough to prove its usefulness, when the expense, even of this system, was too great to be carried on by private enterprise; he tried to have the general government of Great Britain take it off his hands; but, failing in that, the undertaking was abandoned.

To the Massachusetts State Board of Health belongs the honor of being the first governmental officers, aside from those of armies and navies, to establish a system of sickness statistics. That Board adopted substantially the system inaugurated by Dr. Benjamin Ward Richardson, and maintained it very successfully for one year; the published results yielding information of exceedingly great interest and value. But the Massachusetts State Board of Health changed Secretaries, and, apparently, the new officer did not appreciate the important work of his predecessor; at any rate, the valuable sickness statistics then ceased.

To Michigan, after all, must be given the greatest credit for having adopted, perfected, and successfully maintained, through a series of years, the most satisfactory system of sickness statistics the world has yet seen. It commenced in 1876, and adopted, at first, very much the same system as had been proved to yield such valuable data in Massachusetts; but, from time to time, improvements have been made. The most important change was made in May, 1885, since which time the representative physicians in active general practice who report regularly each week, are asked to report only the sickness which occurs under their own observation. The system is thus on a more accurate scientific basis than when the reports included sickness which occurred in the vicinity, under the observation of other physicians; because the opportunities for conferring with other physicians vary greatly, and thus cause in the reports variations which are eliminated by confining the reports to answers to direct questions, relative to each important disease,—Did you or did you not, during the given week, see a case of that disease? How many cases did you see?

This system of sickness statistics rests upon the "law of averages," in accordance with the "law of probabilities," which makes it probable that a considerable number of representative physicians in active general practice, in localities distributed fairly well about a State, will see an average of the sickness which occurs. Theoretically, this was true before the system was inaugurated. Practically, it has been demonstrated to be true, by the several combinations of the sickness statistics which have been made in Michigan. For instance,—it was questioned whether the small number of reports received in time for the weekly bulletin, being about fifty, were sufficient to supply a fair statement of the sickness in Michigan, throughout the State. The question seems to have been answered in the affirmative as follows:—when the fifty reports are compiled, and afterwards fifty more reports are received and compiled, it is generally found that the results of the two compilations are practically the same; indicating that both results are correct. Again, speaking now of the whole number of reports received and compiled in the Annual Report, although during the years 1877–1884 the system was not as perfect as since

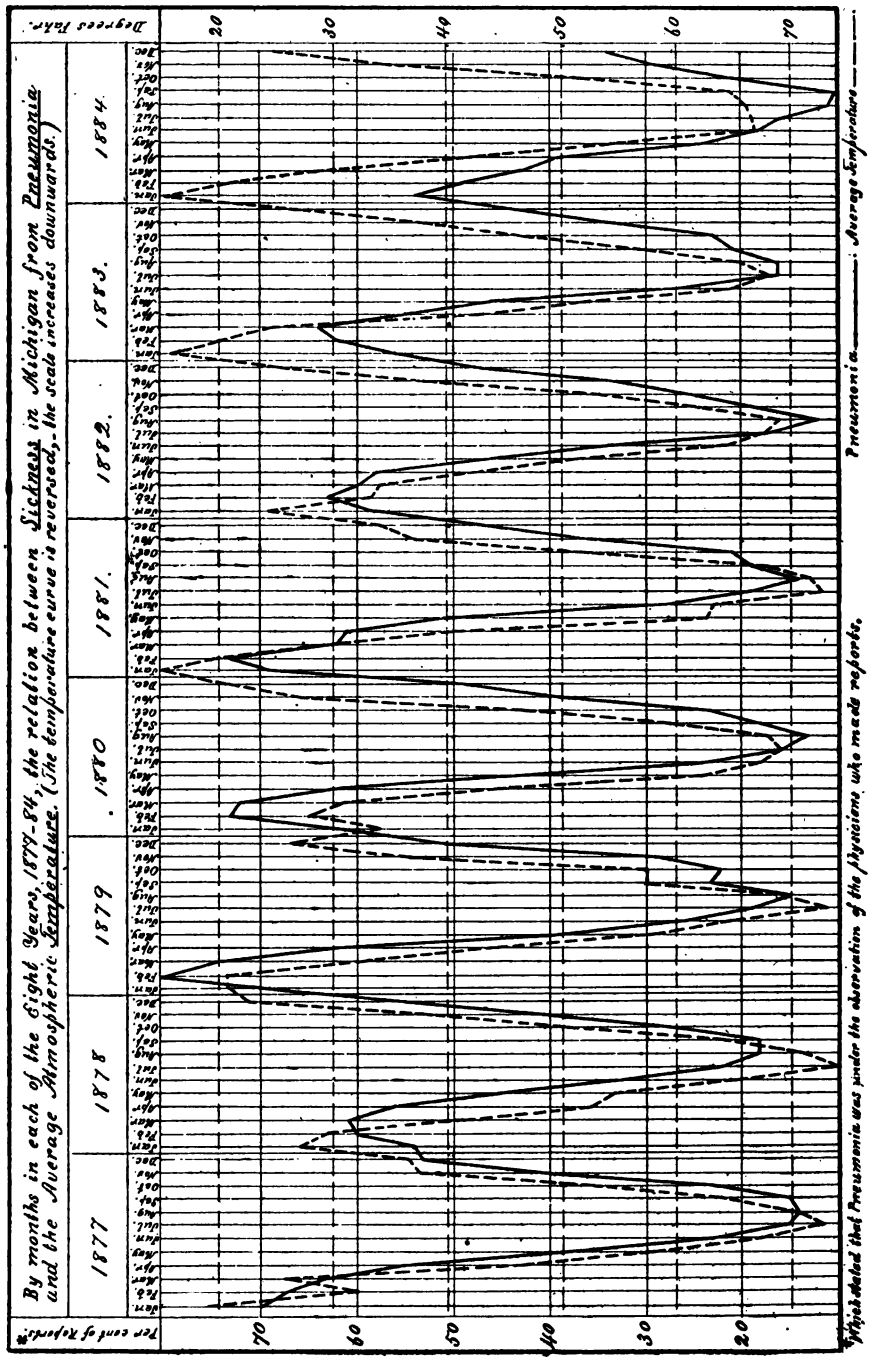
May, 1885, yet such diagrams as that on page 255 of the Annual Report of the Michigan State Board of Health for the year 1886, (reproduced on page cxxxvii this article) prove that the results of the compilation of the weekly reports of sickness then yielded statistics of very great value, and statistics which bore on their face the evidences of reliability, being consistent from month to month, and from year to year. Not only that, but when placed beside the results of tri-daily observations of such "instruments of precision" as the standard thermometers in use by the regular meteorological observers in Michigan, these sickness statistics relating to a prominent disease bore an astonishingly close resemblance to the statistics of the observations of the thermometer. The similarity of the two curves, representing the two sets of observations—of the sickness and of the instruments, is such as to lead to the conviction that both sets of observations are true, and that there is a necessary relation between the sickness and the atmospheric temperature. Until the sickness statistics in Michigan supplied the scientific basis for such studies, such knowledge as that to which I have just referred was not in existence, as a scientific induction; it rested upon the insecure foundation of dogmatic assertions, not supported, as it now is, by large numbers of facts classified and tabulated. Again, diagrams have been constructed containing curves representing the *sickness* reported from several important diseases, and these curves have been compared with curves representing the *mortality* from those diseases during the same time, in Michigan. These comparisons have demonstrated that both kinds of statistics are valuable; although it showed, as was known before, that the mortality statistics in Michigan are not as complete during the earlier as they are during the later months in each year, for reasons which have been published, and have long been well known to those who understand the vital statistics of Michigan.* It is to be hoped that the legislature will be induced to give this subject attention, and will so amend the law for the collection of the mortality statistics as to require that each death shall be immediately recorded, as the sickness now is, within a week of its occurrence, and not be as the deaths are now,—neglected for a year or so before being placed on record.

It is apparent, to whoever will take the trouble to investigate the subject, that the sickness statistics of Michigan are extremely valuable. The vast mine of valuable information has been only very slightly worked as yet, for the reason that few private individuals can find the time to do such careful, painstaking work for such long-continued researches as are required to so marshal the vast numbers of facts as to bear upon a question in the causation of disease. Such work, for the benefit of all, should be done once for all by some one representing the whole people.

Enough has been done by the Secretary of the State Board of Health to prove that the sickness statistics of Michigan are a mine of wealth which will richly repay the work of developing. The part which has been developed is that relating to the diseases of the throat, lungs and air-passages, and those dangerous communicable diseases which enter the body by way of the throat and air-passages. It has been demonstrated that the causes which increase these diseases are associated with coldness of the atmosphere, and that the relation is not only qualitative but quantitative. This information alone is of sufficient value to repay all and more than has been expended for the statistics. But the "cold-weather diseases" are only one

* Explained on pages 3-12 and 158-167, Vital Statistics of Michigan, 1871.

Temperature, and Sickness from Pneumonia in Michigan, in each month during eight years.



part of all,—there remain to be studied the great classes of diseases which prevail most under opposite conditions. There remain also the studies into the exact conditions which are causative of each disease, and those which are only accidental. And, after all the factors shall have been worked out, there will remain the study of the rate of decline of each disease under the influence of the appropriate measures which shall be inaugurated for the prevention or restriction of each disease. Consequently, it should be a long time before the collection, compilation, and utilization of sickness statistics should cease. Should such work ever cease? It would seem not; because even if the causation of all the prominent diseases shall become known, the preventive and restrictive measures thoroughly applied, and the diminution of all preventable diseases shall reach its maximum, there should still be constant surveillance of such sickness as shall remain, in order to be prepared to enter at once upon measures which may at any time be indicated as necessary.

There is another reason than the one already stated why we may not expect the sickness statistics to be immediately used by people generally, but only by statisticians or persons who are willing to work hard and thus grasp the principles of statistical methods. That reason is found in the fact that the sickness statistics do not impress the average person, especially not the casual observer, as being sufficiently reliable upon which to base questions involving human life on a grand scale as is demanded by public sanitation. To some of the physicians who contribute the weekly reports, it seems almost or quite incredible that from the experience of one person like himself in a place, and comparatively few places in Michigan, can be built up statistics which shall enable one to know the exact relations of all the most important and common diseases to the varying conditions of the atmosphere.

Perhaps as useful a service as can be done, at the present time, is to point out how it is that the fifteen years experience with the sickness statistics of Michigan has resulted in the development of statistics which are not only the best that the world has ever seen, but that can be demonstrated to be perfectly reliable.* Some such demonstration here follows:

The Statistical Method, Essential in the Sciences.

It is extremely difficult for any person to master the subject of vital statistics. This should not be wondered at, because all questions relating to the life of man—the most complex of all organized beings—are complex; and the laws or principles of even ordinary statistics are not generally understood. To hear statistics spoken of as unreliable, is a very common occurrence; but it is true, and ought to be generally known, that no general fact is established or can be established except by the statistical method. One experience or one observation of a fact does not establish anything; a few experiences or observations may lead to a belief; but it is only by the grouping together of oft-repeated experiences or observations of facts that a general fact is established, and *the grouping together of experiences and observations of facts*, is the essential part of statistics. Therefore there is no higher method, no more reliable method, than the statistical method. That method is the one employed in every science. For instance, the chemist makes an experiment, and observes a result. In order to reach a

*The confident tone in some portions of this report may be accounted for by the fact that the member of this committee was, for a few years, engaged in compiling and studying general statistics, and for twenty-one years has been continuously engaged in compiling and studying several kinds of vital statistics. Accordingly, it is assumed that this long experience and study of statistical science and practice especially of vital statistics, enables him to test, and judge of, the reliability of such statistics.

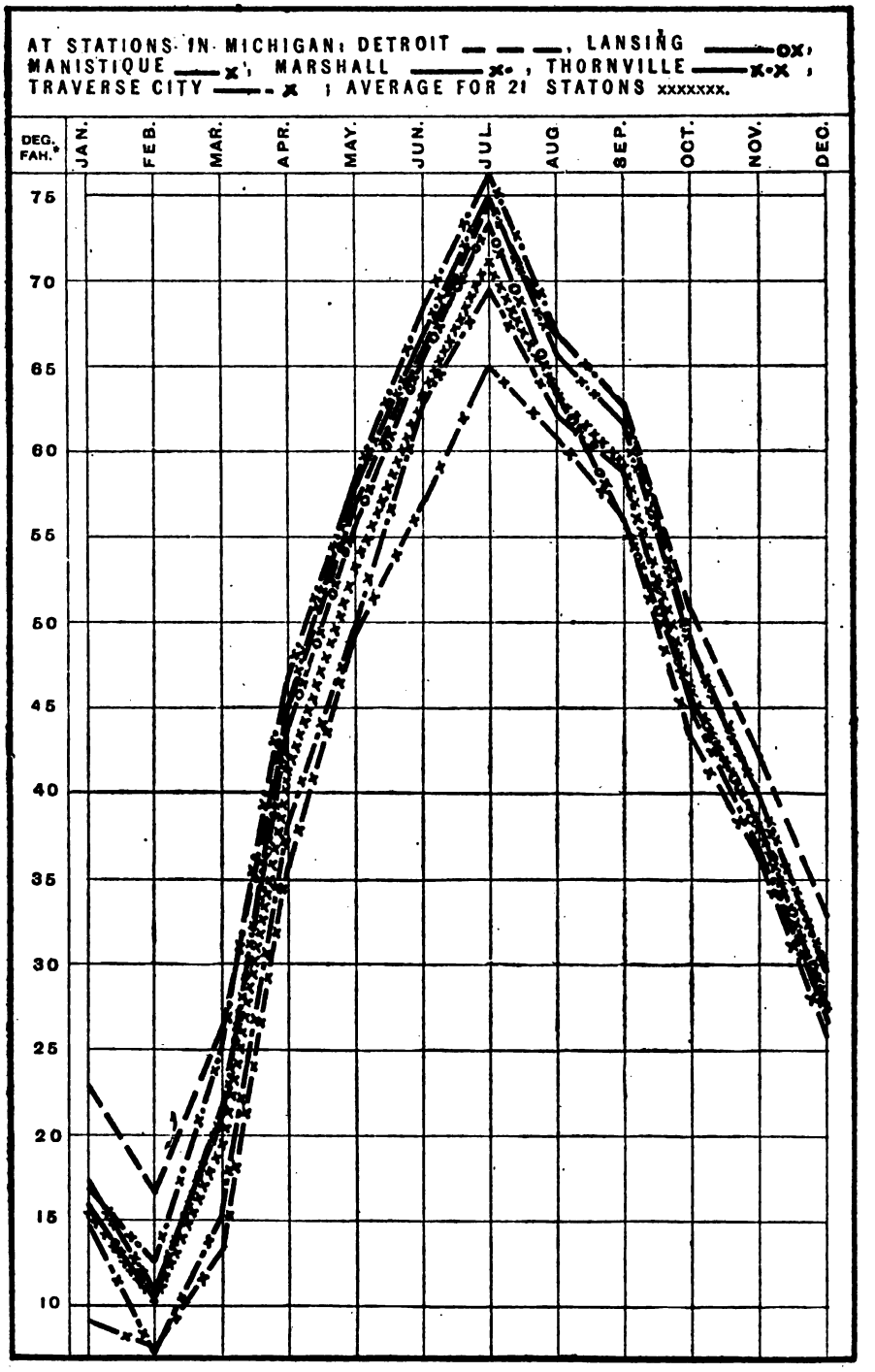
conclusion, however, he must repeatedly observe the same result to follow repetitions of the same experiment. If, because of the imperfections of all manipulations, he does not always reach precisely the same result, he continues, by the statistical method, to learn the amount of the probable error, and, if that is within the limits of variation warranted by the nature of the manipulation, he uses the average result, and if the observations are sufficiently numerous, he relies upon that result; that is to say, if he has (what is really, although he may not so consider it) a *statistical* basis for his conclusion he is satisfied. Not only the science of chemistry, but all sciences rest upon similar foundations.

One of the most common fallacies in the minds of intelligent people is, that statistics are not reliable unless *all* the facts on the given subject are collected. Concerning vital statistics, this false idea is extremely common, even among scientific men who in their own science never seem to think of the comparative paucity of the facts upon which their own conclusions are based. A chemist, for instance, will base conclusions on less than a hundred experiments, sometimes less than a dozen; yet, in vital statistics, he would be likely to question results of observations of many times that number of experiences; and very likely demand that records be used of all the possible experiences.

For Reliable Statistics, not All the Facts are Needed.

Few people realize how perfect is the knowledge which may be gained by statistics which embrace only a small fraction of the great mass of facts which might be collected on the same subject. Take, for instance, in the science of meteorology, the statistics of temperature: It is well known that thermometers hung on the different sides of any building will rarely exactly agree. But it is not so well known that if *one* intelligent and reliable observer take tri-daily observations of a thermometer, placed under proper conditions, in a central location, as, for instance, in Lansing, the results of his observations supply a reliable basis for conclusions concerning the entire State of Michigan, as to the comparative temperature in each month of every year. This is susceptible of demonstration, so that any intelligent person can appreciate the result; and a demonstration for a single year is given on page 27 of the Annual Report of the Michigan State Board of Health for the year 1886, and a similar demonstration is in nearly every Annual Report. Page 27 of the Report for 1886 is here reproduced,—Diagram I, on page cxl. By that diagram, it may be seen that a curve, accurately drawn to scale, representing the exact average daily temperature at Lansing (the line —— ox) is very nearly the same as the curve representing the average for 21 stations in Michigan (in the line xxxxxx). For most purposes, the curve representing the results of the observations of one thermometer by a single person, in a central location, are sufficiently accurate and reliable upon which to base conclusions for the entire State of Michigan. Yet this person is only one of two millions of inhabitants of Michigan, probably half of whom might make observations of the atmospheric temperature, each under conditions slightly different from those of any other person. Why is it that the results of observations by the six persons whose work is represented in Diagram I, prove to be so accurate that each curve is substantially the same as the others? It is because they all use reliable "instruments of precision," because they are careful observers, and because for each significant point in Diagram I, *there were a sufficient number of observations to secure the true average.* This last reason is one which should be understood, because it is an impor-

DIAGRAM I.—AVERAGE TEMPERATURE, BY MOS., IN 1885.



*SCALE, 10° F. TO .92 IN. VERTICALLY.

H. B. T., DEL. DES. BY H. B. B.

tant subject in all statistics. It is a fact, that in grouping together results of large numbers of observations, minor variations tend to neutralize each other so that the average of a large number of observations exhibits the general truth which pervades them all.

How a Statistician may Know whether he has Sufficient Data.

Frequently it is perfectly easy for a statistician to learn whether or not he has a sufficient number of observations to yield the general truth for which he seeks. All that is necessary is to compile a number of the observations, and from the results make a curve, such as is shown in Diagram I. Then compile another group of observations on the same subject, and from those results make another curve; then compare the two curves; if they agree, it proves that either one of the curves is as good as both,—that the general truth has probably been reached by the number of observations used in either of the experiments. This test has been applied to the sickness statistics of Michigan, by taking about one-half of the weekly reports of sickness, and then the other half; and it has been found that fifty weekly reports of sickness supply a sufficient number to give a fairly accurate statement of the sickness in Michigan. Generally that number of reports are received in time for the Weekly Bulletin; the average for the three years, 1889–91, was 58. But for the tables, diagrams, and studies of the sickness statistics in the Annual Report of the State Board of Health, a much larger number is secured, the average for 1889–90 being 98 per week. A few facts on this subject are shown, in tabular form, as follows:

Weekly Reports Received.

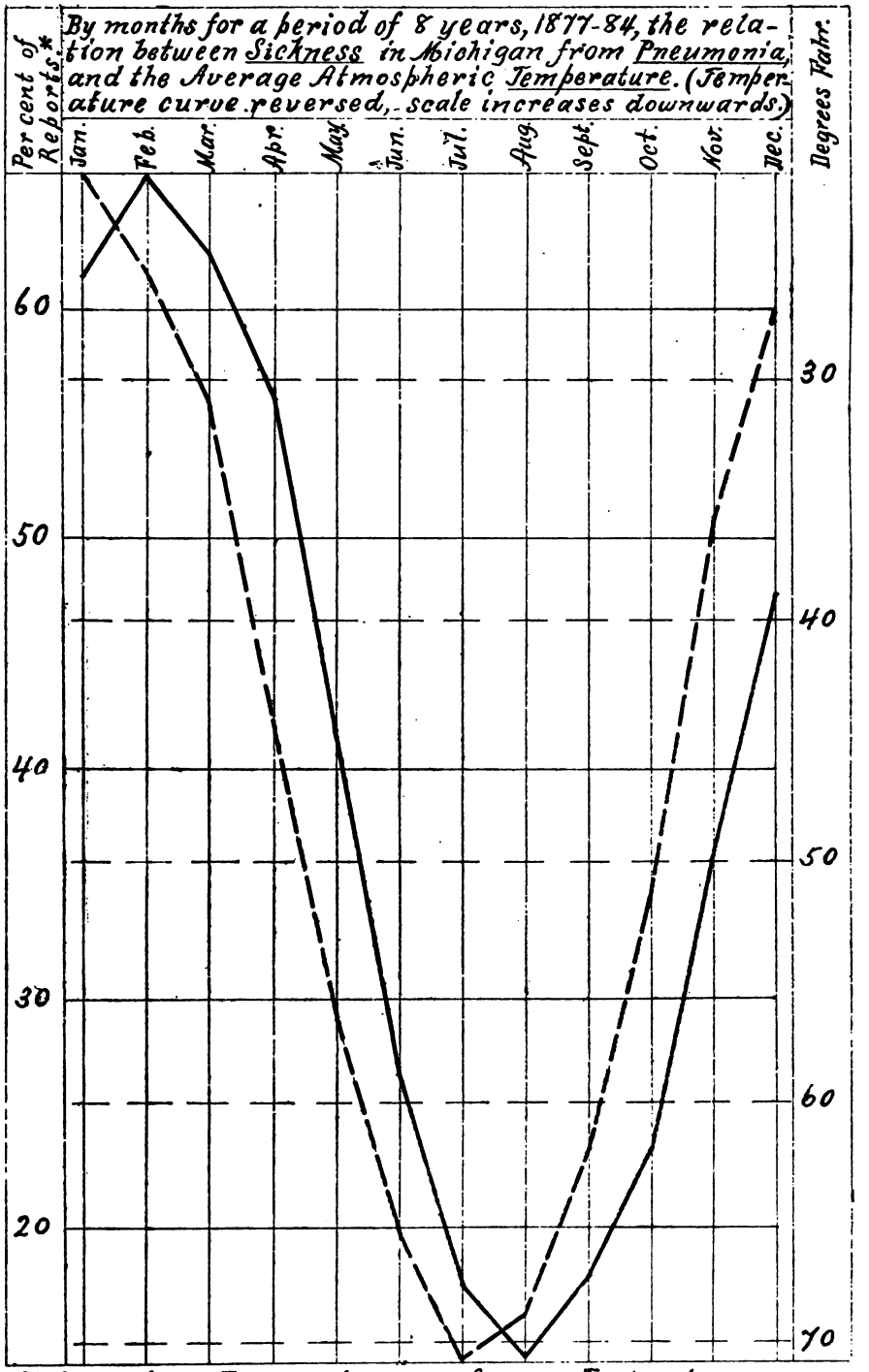
For the Weekly Bulletins.				For the Annual Reports.
Year.	Least.	Most.	Average.	Average per Week.
1889	42	73	58¾	96
1890	44	76	62½	100
1891	44	74	59	88
Averages	43	74	58*	93*

* The average number of weekly reports received per week for the Annual Report was 60 per cent more than those received in time for the Weekly Bulletin. Then the *probable* least number received per week for the Annual Report would be 60 per cent more than 43 (the average least number received in time for the Weekly Bulletin) or 69.

In the Annual Report, no attempt is made to study the subject by weeks, but the lowest unit is by months; so that, for each significant statement in a table or diagram, about four hundred observations are grouped to learn the average statement.

But even the evidence of four hundred reports is not relied upon to finally decide the exact relation which a given disease sustains to atmospheric temperature, or other causative condition of sickness, although frequently it might safely be relied upon, as is proved by the diagram on page 255 of the Annual Report of the Michigan State Board of Health for the year 1886, which diagram is here reproduced on page cxxxvii. The custom of the writer has been to still further multiply the evidence by grouping it by months for a *series of years*. Thus, in Diagram No. 1, page 252, Report

NO. 1.—TEMPERATURE, AND SICKNESS FROM PNEUMONIA IN MICHIGAN.



Sickness from Pneumonia ———. Average Temperature — — —.

*Per cent of all reports received which stated the presence of pneumonia then under the observation of the physicians reporting.

Over 30,000 weekly reports of sickness, and over 150,000 observations of the atmospheric temperature are represented in this diagram.

of Michigan State Board of Health for the year 1886, corrected* and reproduced here (page cxlii), over 30,000 weekly reports of sickness, and over 150,000 observations of the atmospheric temperature are represented. The result is, that there is such a scientific demonstration of the relation of those two phenomena as to carry conviction to the mind of any sane, intelligent person who will take the trouble to study the subject. No such person can have a "reasonable doubt" of the truth of both sets of observations there delineated. The tables and that diagram demonstrate completely, and settle the question for all time, as to the relation of sickness from pneumonia to atmospheric temperature in Michigan during those years,—the sickness decreases as the temperature rises, and increases as the temperature falls, and the relation is almost exactly quantitative.

Mathematical Demonstration that the Relation of Pneumonia to Temperature is Quantitative.

To demonstrate the fact that the relation is very nearly quantitative, it is only necessary to make a few simple computations, and to graphically picture to the eye the results of those computations, as follows:

A table exhibiting the average temperature and the average per cent of the weekly reports which stated the presence of pneumonia, as graphically represented in the diagram (No. 1), is as follows:

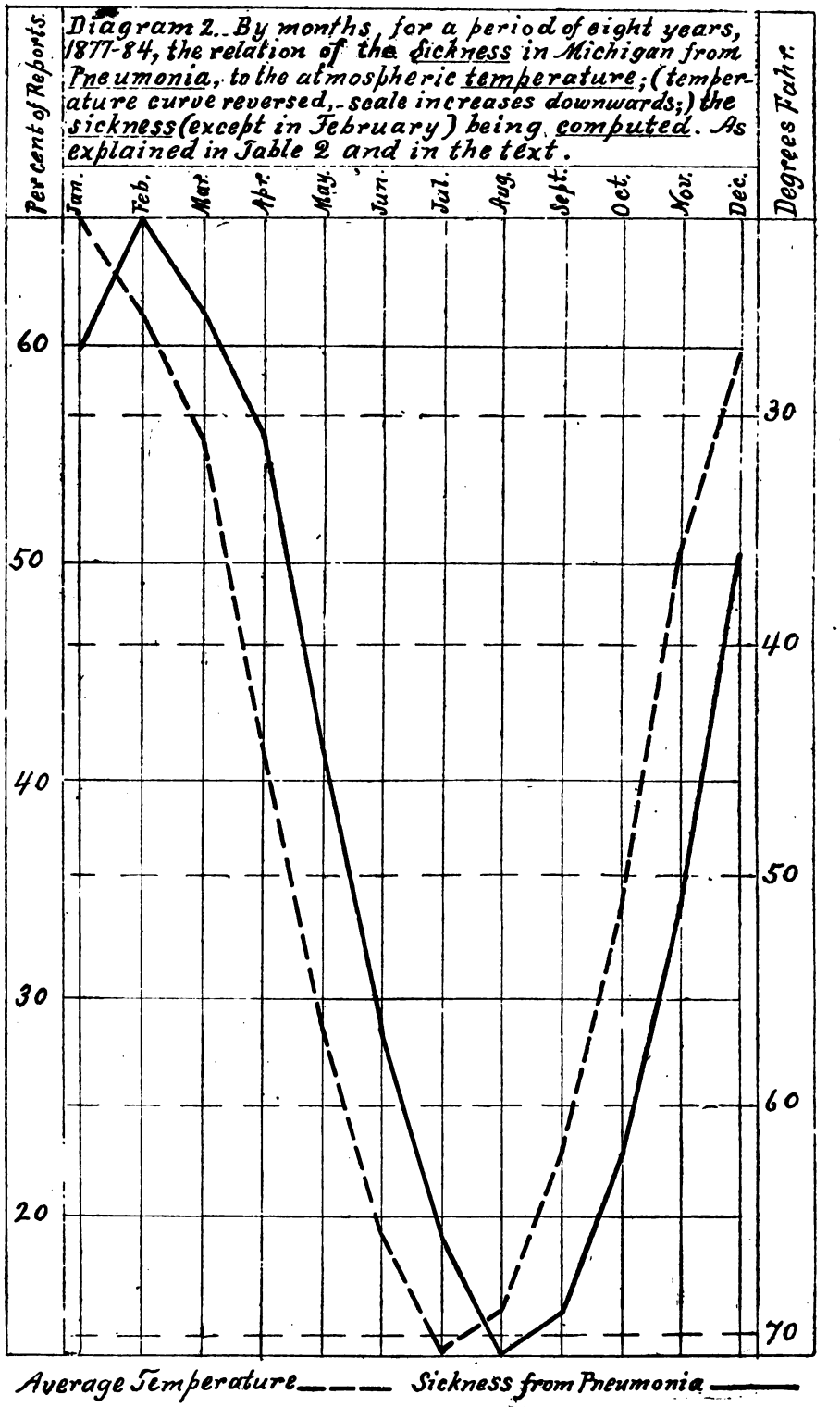
TABLE 1.—*By months, for a period of eight years, 1877–84, the relation between* **Sickness** *from* **Pneumonia** *and the average temperature of the atmosphere in Michigan.* (*A fraction of .5 or more is called 1, of less than .5 is disregarded.*)

Eight years, 1877–1884.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. temperature, deg. F....	21.43	25.60	31.04	44.48	56.60	65.54	70.68	68.85	62.05	51.34	35.99	27.25
Av. per cent of reports of sickness.....	62	66	62	56	42	27	17	14	18	23	36	48

It may be seen that the difference between the lowest temperature (21.43) in January and the highest temperature (70.68) in July, is 49.25° F. It may be seen that the difference between the least sickness (14 per cent of reports) in August, and the most sickness (66 per cent of reports) in February was 52. If we assume that a change in atmospheric temperature equal to 49.25° F. causes a change in the sickness equal to 52 (per cent of reports), what change in the sickness should follow a change in temperature of 4.17° Fah., as occurred between January and February? (The average during the eight years embraced in the diagram.) As 49.25 is to 52, so is 4.17 to the answer sought. The answer is 4.42. Then, inasmuch as it is plain, by the diagram, that the sickness changes follow a month later than the temperature changes, and inversely to the temperature, and the temperature change was a *rise*, there should have been a *fall* in the sickness equal to 4.4, from what it was in February. In February the per cent of reports was 66; 66 — 4.4 = 61.6, which is the computed sickness for March. Similarly, as 49.25 is to 52, so is 5.44 (the temperature rise between February and March) to the fall in the sickness in April. Continuing this process through the several months, we compute a table exhibiting the sickness as it would be if exactly quantitative relations hold throughout. (Practically, the computations are more quickly made by obtaining a unit of measurement, which may be done by dividing the total range of per cent

* The need for correction was discovered by comparing the diagram of computed results (Diagram 2, p. cxliv) with original diagram in the Report for 1886.

NO. 2.—TEMPERATURE AND COMPUTED SICKNESS FROM PNEUMONIA.



of sickness (52) by the total range of temperature (49.25); when the quotient (1.06) will be the unit of variation in per cent of sickness equal to a variation of one degree of temperature.) The computed table is as follows:

TABLE 2.—*By months, for a period of eight years, 1877-84, the relation between* **Sickness** *in Michigan from* **Pneumonia,** *to the atmospheric temperature; the sickness (except in February) being* **computed,** *assuming that, in each month, the rise or fall of the sickness sustains the same relation to the rise or fall of the atmospheric temperature in the preceding month, as the total range of sickness sustains to the total range of monthly averages of temperature for the year. (A fraction of .5 or more is called 1, of less than .5 is disregarded.)*

Eight years, 1877-1884.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. temperature, deg. F....	21.48	25.60	31.04	44.48	56.60	65.54	70.68	68.85	62.05	51.34	35.99	27.25
Av. per cent of reports of Sickness (computed)....	60	66	62	56	42	29	19	14	16	23	34	51

This table may be compared with Table No. 1, which exhibits the actual statistics as compiled from the reports. This computed table is graphically represented in Diagram No. 2, p. cxliv which can be compared with Diagram No. 1, which represents the actual statistics, as compiled from the reports. By comparing the two tables (on pages cxliii and cxlv) it will be seen that in six of the months the figures are the same in each; in the other months they are nearly the same, the greatest difference being in December, for which month the actual figures fall short of the computed ones by 3. The comparisons are best made by means of the two diagrams, 1 and 2. But before or after comparing the two diagrams, it seems marvelous that accurate curves representing two such different phenomena as atmospheric temperature and sickness from pneumonia, observed and reported by entirely different classes of persons, should be found to run so almost exactly parallel as do the two lines in Diagram 1. That twelve successive changes in atmospheric temperature should be followed by twelve successive changes in the amount of sickness, so almost exactly in proportion to the temperature changes can be accounted for only by the belief that there is a necessary relation between those two phenomena. If there is a necessary relation, it should be quantitative, unless other phenomena cause variation. The variation thus far apparent is so small as to indicate that it may be due to very slight imperfections in the observations. To which set of observations the slight variation is chargeable—whether of the temperature, by the meteorologists, or of the sickness, by the physicians,—remains to be ascertained; because, although the temperature is learned by the use of "instruments of precision," the observations are not made every hour of the day and night, but only three times a day, and this may not, in every month, give us the exact average temperature, while the sickness reports represent all the time, day and night. On the other hand, during the years represented in the diagrams, the sickness reports were on the old plan, including all sickness believed to occur, even if not under the actual observation of the physician who reported. The subject can be further studied, and the exact truth can be ascertained. But these refinements in statistics are for the expert statistician. That they exist in sickness statistics of Michigan is conclusive evidence that these statistics are

exceedingly accurate. And it is gratifying to know that by means of the sickness statistics of Michigan the essential facts as to the causal relation of pneumonia to atmospheric temperature has already been learned. It remains for pathologists and sanitarians to utilize that knowledge and finally to point out to the people how to take advantage of that knowledge, and use it for the lessening of sickness and deaths from pneumonia.

Causal Relations of Meteorological Conditions to Diseases have been Established. A Plea for the Continuance of the Work.

What has been done relative to pneumonia has been done for several other very important diseases, including the most important one of all—consumption.

The fact is that the work with sickness statistics in Michigan is now in advance of some of the other lines of scientific research; and before reaping the full benefit of the statistics we must wait for other sciences, but that is not a valid reason for stopping the important work of collecting facts with which to still further advance the work with sickness statistics.

So important are the scientific results, concerning the causation of disease, already obtained by the present Michigan system of sickness statistics, and so promising are the results yet to be worked out, that I am constrained to most earnestly plead with other State Boards of Health to take up and carry forward this system of sickness statistics.

If the several State Boards will do this, it will then be much easier than otherwise it would be for a national public-health service to constantly have such knowledge of the actual state and condition of health in every part of the United States as it should have to enable it to best guard, from time to time, the highest interests of the people of this great country.

Such a system of sickness statistics for the United States will be essential before it can be known what, on the whole, are the conditions which tend to the most perfect health, and what are the conditions most important to be avoided or guarded against. The Michigan statistics indicate that atmospheric conditions are the *controlling* causes of most of the important diseases,—those which cause most deaths. It is a fact that the migratory birds have, and act upon, such knowledge. Man's control over nature is increasing, and will increase much more rapidly if preventable sickness and premature deaths are stopped. This country is being traversed by intricate net-works of railroads. Through increasing prosperity, because of lessened burdens on account of the prevention of sickness and deaths, the people are becoming able to travel, whereas formerly it would have been impossible. It should soon be practicable for man to approach in wisdom and in practices the migratory birds. A long step in that direction will have been taken when a good system of sickness statistics has been established throughout the country.

HENRY F.
VAUGHAN
LIBRARY

PRINCIPAL METEOROLOGICAL CONDITIONS IN MICHIGAN IN 1891.

COMPARISONS OF CONDITIONS IN 1891 WITH THOSE IN PRECEDING YEARS.

A COMPILATION OF REPORTS BY OBSERVERS FOR THE STATE BOARD OF HEALTH AND FOR THE UNITED STATES SIGNAL SERVICE.

COMPILED UNDER THE DIRECTION OF THE SECRETARY OF THE MICHIGAN STATE BOARD OF HEALTH.

In the Annual Reports of this Board, there has been published for each of the years 1877 to 1890, inclusive, a summary relative to the principal meteorological conditions as observed during the year. This paper continues the subject for the year 1891. The names of the observers for that year, and the months in that year for which copies of registers of meteorological conditions were received from each, are stated in Exhibit 1, page 3. In Exhibit 2, page 4, is given the latitude, longitude, and elevation of each station. In the tables which follow, reports received from any observer for less than half the year have not been used.

The principal conditions treated in the following tables are temperature and humidity of the air, cloudiness, fogs, rainfall, ozone, velocity and direction of the wind, and pressure of the atmosphere. The tables on each subject are illustrated by diagrams representing to the eye variations in the given condition from month to month through the year, at the several localities represented.

These tables give not only the meteorological conditions for the year and month under consideration, but they also contain, for purposes of comparison, statements of the average conditions for the longest period available in each case.

In the latter part of the Report for 1886, there was published an article on "The Causation of Pneumonia," in which extensive use was made of meteorological statistics, especially those relating to the meteorology of Michigan. In the Report for 1887, in an article on "The Causation of the Cold-weather Diseases," influenza, tonsillitis, bronchitis, scarlet fever,

diphtheria, and small-pox are proved to sustain very close relations to meteorological conditions. Extensive use of meteorological and sickness statistics is made in the Report for 1887, in an article entitled "The Relations of Certain Meteorological Conditions to Diseases of the Lungs and Air-passages."

In the Report for 1891, "Abstract of Proceedings, April 14, 1891," in a discussion on the subject of "The Causation of Influenza," is an important use of meteorological data, with diagrams and other evidence, showing how closely influenza is associated with atmospheric temperature, humidity, ozone and wind.

In the Report for 1891, page cxxvii, is an article entitled "Relations of certain meteorological conditions to diseases of the lungs and air-passages in Colorado," in which are also data relative to other states and countries.

The article in this Report in relation to "Causes of Diseases," based upon weekly reports of sickness in Michigan, may well be studied in connection with this article, the main purpose of which is to serve as a basis for studies of the causes of diseases.

Incidentally, it is believed that there is nowhere else so complete a statement of the facts relating to the meteorology of Michigan as here presented, for any use for which such knowledge may be needed, now or hereafter.

EXHIBIT I.—*Names of observers whose Reports are summarized in the following Meteorological Tables and Diagrams, their Places of Observation, and the Counties and Geographical Divisions of the State in which these Places are situated, and months for which reports were received from each observer.*

Name of Observer.	Place of Observation.	County.	Divisions of the State.*	Months (inclusive) for which Registers were Received.
W. C. Gates, M. D.	Rockland	Ontonagon	U. P.	January to December.
W. W. Dent, U. S. Signal Officer	Marquette	Marquette	U. P.	January to April.
P. McDonough, U. S. Signal Officer	Marquette	Marquette	U. P.	May to December.
C. L. Bozzell, U. S. Signal Officer	Sault Ste. Marie	Chippewa	U. P.	June to December.
Arthur Beebe	Gulliver Lake	Schoolcraft	U. P.	January to December.
Jas. I. Widmeyer, U. S. Signal Officer	Manistee	Manistee	N. W.	January to December.
S. E. Wait	Traverse City	G'd Traverse	N. W.	January to December.
James J. Fitz Gerald, U. S. Signal Officer	Alpena	Alpena	N. E.	January to June.
H. McP. Baldwin, U. S. Signal Officer	Alpena	Alpena	N. E.	July to December.
D. W. Mitchell, M. D.	Harrisville	Alcona	N. E.	January to December.
Geo. W. Felger, U. S. Signal Officer	Grand Haven	Ottawa	W.	January to December.
H. L. Boyce, U. S. Signal Officer	Port Huron	St. Clair	B. & E.	January to June.
Arthur B. Crane, U. S. Signal Officer	Port Huron	St. Clair	B. & E.	July to December.
John S. Caulkins, M. D.	Thornville	Lapeer	B. & E.	January to December.
Prof. J. W. Ewing	Alma	Gratiot	C.	January to May.
Prof. R. C. Kedzie	Agr'l College	Ingham	C.	January to December.
T. R. Mac Clure	Office State B'd of Health, Lansing	Ingham	C.	January to December.
C. H. Prentiss	Otsego	Allegan	S. W.	January to October.
Prof. Chas. E. Barr	Albion	Calhoun	S. C.	January to December.
Prof. M. W. Harrington	Ann Arbor	Washtenaw	S. C.	January to December.
J. H. Kellogg, M. D.	Battle Creek	Calhoun	S. C.	January to December.
Lieut. A. H. Boies	Hudson	Lenawee	S. C.	March to December.
Geo. C. Palmer, M. D., Supt. Asylum for Insane	Kalamazoo	Kalamazoo	S. C.	January and February.
Wm. M. Edwards, M. D., Supt. Asylum for Insane	Kalamazoo	Kalamazoo	S. C.	September to December.
Geo. H. Greene, M. D.	Marshall	Calhoun	S. C.	January to December.
Lewis Marvill	Parkville	St. Joseph	S. C.	January to December.
C. E. Beers	Tecumseh	Lenawee	S. C.	January to December.
S. Alexander	Birmingham	Oakland	S. E.	January to December.
Edward A. Evans, U. S. Signal Officer	Detroit	Wayne	S. E.	January to December.

* The counties in each division are stated in Exhibit I, on a subsequent page.

EXHIBIT 2.—*Latitude and Longitude, Elevation above Sea Level, and the Average Temperature, and Average Barometric Pressure in 1891, at 7 Meteorological Stations in Michigan,—the names of the Stations being arranged in order by latitude, highest first.*

Localities in order of Latitude, those farthest North, first.	Latitude North.	Longitude west from Greenwich.	Altitude (Approximate) above Sea Level,—Feet.	Height of Mercury in Cistern of Barometer above Sea Level,—Feet.	Average Temperature, 1891, Degrees Fahr.	Average Atmospheric Pressure, 1891, Inches of Mercury corrected for Temp.
Rockland			** 1,094		42.76	28.672
Marquette	46°34'	87°24'	669	735		
Sault Ste. Marie	46°28'	84°22'	642			
Gulliver Lake	45°59'	86°1'	627	631	41.31	29.304
Alpena	45°5'	83°3'	587	609		
Traverse City	44°45'	85°40'	598	605	46.09	29.321
Harrisville	44°39'	83°18'	616		43.57	29.301
Manistee	44°13'	86°16'	600	615		
Alma	43°25'	84°45'	750	760		
Grand Haven	43°5'	86°18'	590	621		
Port Huron	43°0'	82°26'	602	639		
Thornville	* 42°55'	* 83°10'	§ 975	§ 980	49.18	28.954
Agricultural College	42°44'	84°29'	820	834	47.38	29.100
Lansing S. B. of H.	† 42°44'	† 84°33'	¶ 900	917	48.27	29.076
Birmingham	42°30'	83°10'	‡ 752		49.01	29.129
Otsego	42°28'	85°43'	720	733		
Detroit	42°20'	83°3'	603.9			
Battle Creek	42°20'	85°11'	800		50.52	29.063
Kalamazoo	42°18'	85°37'	944	955		
Ann Arbor	42°17'	83°44'	930	936	48.71	29.028
Marshall	42°17'	84°58'	833	886	48.75	29.023
Albion	42°14'	84°45'	965	985.25	49.43	28.958
Hudson	41°58'	84°21'	970			

* Estimated from lines on a map of Michigan issued by the General Land office, Department of the Interior, 1878. For stations having no reference mark, the latitude and longitude were stated by the observer on the meteorological reports received.

† The exact latitude and longitude of the astronomical post placed in the ground near the new Capitol at Lansing by the U. S. Lake Survey in 1875, as determined by the observations then made, is 42°43' 53.11" N. and 84°33' 19.68" W.

‡ Estimated from data on "Railroad Profiles," pages 179-187, Annual Report of the State Board of Health for 1878.

§ Estimated from data in Tackabury's Atlas of the State of Michigan.

¶ Estimated from comparisons of barometrical observations at Lansing, Port Huron, and Grand Haven, for the four years, 1879-82.

** From data kindly furnished by D. J. Whittemore, chief engineer C. M. & St. Paul Railway.

NOTE.—Green's standard barometer was used at the above stations for the year 1891.

EXHIBIT 3.—*Average Temperature by Years and Months, for each of the Years 1867–91, and the Average for the 14 Years, 1877–90. These Averages are for Groups of Several Stations in Michigan.*

Years, etc.	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 14 Yrs., '77-90	46.09	21.17	23.43	29.48	44.25	56.00	65.61	70.81	67.84	60.88	49.45	36.49	27.69
1877	48.67	19.18	32.27	25.92	46.71	58.24	67.48	72.80	70.52	63.80	52.78	37.57	36.78
1878	49.24	27.17	29.75	41.46	52.27	54.73	65.18	74.22	70.92	63.99	50.13	38.34	22.74
1879	46.82	20.86	20.69	33.08	44.29	58.03	64.70	73.16	68.99	57.43	57.43	36.80	26.41
1880	46.55	34.06	27.93	31.00	44.39	62.27	67.41	69.39	68.07	59.54	46.69	27.24	20.67
1881	47.22	14.93	19.75	29.36	40.53	62.72	63.32	72.95	71.76	67.99	51.87	37.42	34.03
1882	47.14	24.32	33.42	34.12	42.65	51.04	64.43	67.84	69.05	61.70	53.53	37.90	25.72
1883	43.52	15.78	20.03	24.63	43.00	51.37	64.73	68.36	65.41	57.24	46.73	38.10	26.89
1884	44.72	15.14	20.94	28.78	42.00	54.38	67.04	66.70	66.10	64.72	51.56	34.53	24.77
1885	42.36	15.46	10.21	19.51	41.39	53.32	63.39	71.13	63.23	59.14	45.78	38.14	27.59
1886	44.82	18.72	21.18	30.10	46.04	54.69	63.31	68.68	67.36	61.15	51.84	34.32	20.44
1887	44.82	16.58	21.57	25.55	42.09	60.68	66.53	73.22	66.41	57.95	44.46	35.18	27.57
1888	45.03	15.93	21.65	25.89	42.81	53.40	68.03	70.95	68.05	58.20	46.01	38.73	30.70
1889	47.36	28.18	18.57	35.83	46.04	56.74	63.05	70.69	68.58	61.36	44.59	37.95	36.76
1890	46.99	30.06	30.07	27.47	45.23	52.41	69.93	71.29	65.28	58.06	48.88	33.60	26.65
1891	47.61	26.90	27.33	28.93	47.11	55.40	67.62	66.67	68.16	65.50	49.01	34.57	34.11

EXHIBIT 4.—*Average Temperature by Year and Months, for each of the Years 1879–91, and the Average for the 12 Years, 1879–90, at the Office of the State Board of Health, State Capitol, Lansing, Michigan.*

Years, etc.	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 12 Yrs.,'79-90	47.22	22.01	24.03	30.98	46.02	58.37	67.65	72.43	68.65	61.26	50.12	37.21	27.95
1879	48.87	21.78	22.49	36.27	47.54	60.88	67.71	75.86	70.65	58.11	59.50	38.22	27.46
1880	48.94	36.81	31.62	34.19	47.46	65.48	69.44	71.69	70.38	61.19	48.64	28.78	21.65
1881	49.59	16.98	22.27	30.59	43.23	66.94	65.99	75.41	74.63	71.33	53.63	38.78	35.28
1882	49.23	25.65	35.88	36.14	44.83	53.10	66.86	72.57	71.34	63.64	55.63	39.00	26.13
1883	45.69	17.01	22.07	28.04	46.42	53.28	66.98	70.42	67.78	59.42	48.31	40.09	28.47
1884	47.43	16.48	23.89	32.26	45.30	58.20	70.69	69.77	68.58	67.99	53.47	36.51	26.01
1885	43.01	15.85	10.49	21.57	43.97	55.71	65.26	73.35	63.28	55.86	45.43	38.21	27.14
1886	46.19	19.02	22.44	32.09	50.16	57.77	66.20	70.87	68.49	61.81	51.78	34.02	19.61
1887	46.69	18.26	24.39	27.81	45.27	64.24	69.44	75.76	67.06	58.66	45.19	36.59	27.63
1888	45.49	15.63	22.38	27.49	44.80	53.91	68.80	71.09	67.77	57.79	46.32	39.16	31.19
1889	47.65	29.00	18.89	36.81	46.91	56.99	63.36	70.59	68.46	61.32	44.39	37.71	37.31
1890	47.89	31.63	31.51	28.53	46.86	53.94	71.03	71.81	65.38	57.97	49.09	39.46	27.46
1891	48.27	27.74	29.13	29.59	48.12	56.01	68.27	66.84	68.20	65.87	49.39	34.80	35.23

EXHIBIT 5.—*Average Temperature by Year and Months, for each of the Years 1864–91, and the Average for the 27 Years, 1864–90, at the Agricultural College, Michigan.*

Years, etc.	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov	Dec.
Av. for 27 Yrs., '64-90	46.48	21.90	23.78	30.91	45.73	57.97	67.61	71.52	68.59	60.18	48.10	35.64	26.04
1864	47.32	22.26	27.32	31.74	45.86	60.19	67.62	74.52	70.72	59.62	45.74	37.88	24.27
1865	48.12	21.10	27.59	39.96	47.40	57.65	70.76	65.60	65.84	67.66	46.50	38.63	27.72
1866	45.60	21.16	22.71	29.60	48.94	55.04	66.60	71.72	62.60	55.80	49.50	37.94	25.53
1867	46.91	17.61	30.89	29.72	48.20	51.11	71.61	71.60	69.78	56.60	50.60	40.44	25.31
1868	46.34	19.00	18.72	37.80	43.68	59.08	68.46	77.19	70.33	58.77	45.19	36.77	21.16
1869	46.27	29.38	26.66	27.60	45.70	56.02	64.45	70.35	70.58	63.45	40.80	32.05	28.16
1870	49.11	25.37	24.25	30.28	50.39	64.32	70.87	74.40	70.11	63.66	52.45	38.40	24.80
1871	47.93	24.75	25.65	38.18	50.13	61.39	68.21	70.60	71.19	58.10	53.91	31.95	21.12
1872	45.54	21.59	21.34	24.75	47.39	58.48	71.82	74.91	71.22	62.03	47.44	29.80	15.74
1873	44.54	15.87	19.10	28.30	43.17	56.96	70.60	70.82	69.49	57.38	44.68	28.49	29.54
1874	47.05	27.70	25.51	32.30	36.87	59.58	70.61	72.02	69.39	62.85	49.10	35.00	26.96
1875	43.06	12.87	7.99	26.20	41.11	60.82	66.57	69.67	65.48	58.50	42.93	32.96	31.58
1876	46.17	30.22	27.38	30.55	44.16	57.95	68.14	72.48	71.55	56.30	43.74	36.33	15.23
1877	47.42	18.07	32.31	24.51	46.16	58.25	65.93	71.43	68.46	61.28	50.83	35.24	36.57
1878	48.29	29.11	28.07	40.90	50.55	54.57	64.08	73.04	70.15	63.15	48.33	36.29	21.29
1879	46.88	19.19	20.40	33.19	44.84	58.76	66.02	74.08	70.00	56.21	57.28	38.22	27.46
1880	47.32	37.10	29.19	35.50	45.87	64.30	67.60	68.04	68.58	55.93	46.23	27.52	22.07
1881	48.73	16.98	21.58	30.28	45.59	65.24	64.31	73.43	72.69	69.69	52.51	38.20	34.31
1882	47.57	24.89	35.12	35.96	44.70	52.73	66.49	67.71	69.52	59.98	52.67	36.30	24.80
1883	43.52	14.39	19.76	24.89	43.48	52.98	65.87	68.94	64.90	56.48	46.17	38.08	26.39
1884	45.66	15.46	23.43	29.89	43.66	56.90	68.92	67.95	66.91	65.06	50.91	34.11	24.71
1885	42.90	15.34	8.94	21.26	43.59	55.76	64.69	72.70	68.62	58.94	44.95	37.22	27.75
1886	46.20	18.78	22.27	31.33	50.18	58.06	65.72	70.68	69.30	62.07	52.37	33.94	19.74
1887	46.60	18.20	24.26	28.29	45.37	64.28	68.53	75.51	67.96	58.86	44.97	35.66	27.30
1888	45.03	15.40	21.95	27.03	44.03	53.65	67.89	70.53	67.55	57.76	45.70	38.50	30.39
1889	47.33	28.04	18.25	36.51	46.59	57.37	62.83	70.19	68.56	61.24	44.19	37.39	36.75
1890	47.60	31.54	31.54	28.15	47.08	53.69	70.40	71.04	65.42	57.76	49.11	39.06	26.45
1891	47.38	26.70	26.60	29.30	47.40	55.70	67.40	65.30	67.90	65.10	48.80	33.90	34.50

EXHIBIT 6.—*Statements of Meteorological Conditions in the Year and in each Month of the Year 1891, Compared with the Annual and Monthly Averages for 1890, and for several Stated Periods of Years. These statements and Averages are for* **Groups of Several Stations in Michigan.**

Meteorological Conditions.	1891 Compared with Averages for Previous Years.		In 1891	Meteorological Conditions.	1891 Compared with Averages for Previous Years.		In 1891
	No. of Years Averaged, end'g with 1890.	More (+), or Less (-), in 1891 than the Average for Previous Years.	More (+), or Less (-), than in 1890.		No. of Years Averaged, end'g with 1890.	More (+), or Less (-), in 1891 than the Average for Previous Years.	More (+), or Less (-), than in 1890.
YEAR 1891.				YEAR 1891. *Continued.*			
Av. Temp.	14	+1.52°	+.62°	Cloudiness	14	−1 per ct.	−1 per ct.
Range of Temp.*	14	−12°	−12°	Rainfall	14	−3.31 in.	+1.46 in.
Av. Monthly Range of Temp.*	14	−5°	−4°	Atmospheric Pressure	14	−.100 in.	−.068 in.
Av. Daily Range of Temp.*	12	−.08°	+.63°				
JANUARY.				FEBRUARY.			
Av. Temp.	14	+5.73°	−3.16°	Av. Temp.	14	+3.90°	−2.74°
Range of Temp.*	14	−13°	−18°	Range of Temp.*	14	−8°	−2°
Av. Daily Range of Temp.*	12	−3.19°	−2.32°	Av. Daily Range of Temp.*	12	−1.90°	+1.77°
Cloudiness	14	+9 per ct.	+7 per ct.	Cloudiness	14	+6 per ct.	+1 per ct.
Rainfall	14	−.36 in.	−1.62 in.	Rainfall	14	+.56 in.	+.73 in.
Atmospheric Pressure	14	−.151 in.	−.146 in.	Atmospheric Pressure	14	−.195 in.	−.124 in.
MARCH.				APRIL.			
Av. Temp.	14	−.55°	+1.46°	Av. Temp.	14	+2.86°	+1.88°
Range of Temp.*	14	−14°	−19°	Range of Temp.*	14	+2°	−2°
Av. Daily Range of Temp.*	12	−2.81°	−1.02°	Av. Daily Range of Temp.*	12	+.16°	−1.11°
Cloudiness	14	+9 per ct.	+11 per ct.	Cloudiness	14	−1 per ct.	+6 per ct.
Rainfall	14	+.46 in.	+.62 in.	Rainfall	14	−.49 in.	−1.34 in.
Atmospheric Pressure	14	−.087 in.	−.069 in.	Atmospheric Pressure	14	−.115 in.	−.170 in.
MAY.				JUNE.			
Av. Temp.	14	−.60°	+2.99°	Av. Temp.	14	+2.01°	−2.31°
Range of Temp.*	14	−7°	−10°	Range of Temp.*	14	+3°	0
Av. Daily Range of Temp.*	12	+2.75°	+5.16°	Av. Daily Range of Temp.*	12	+.63°	+1.06°
Cloudiness	14	−10 per ct.	−20 per ct.	Cloudiness	14	0	0
Rainfall	14	−2.18 in.	−3.47 in.	Rainfall	14	−1.41 in.	−1.21 in.
Atmospheric Pressure	14	+.004 in.	+.098 in.	Atmospheric Pressure	14	−.094 in.	−.074 in.

* By registering thermometers.

Comments on Exhibit 6 are printed on pages 8 and 10.

The high temperature for January and December, and the small amount of rainfall for the year 1891, are especially noticeable.

EXHIBIT 6.—CONTINUED.—*Meteorological conditions at Stations in Michigan, in Months for the Year 1891, Compared with Averages for Corresponding Months in Preceding Years.*

Meteorological Conditions.	1891 Compared with Averages for Previous Years.		In 1891 More (+), or Less (-), than in 1890.	Meteorological Conditions.	1891 Compared with Averages for Previous Years.		In 1891 More (+), or Less (-), than in 1890.
	No. of Years Averaged, end'g with 1890.	More (+), or Less (-), in 1891 than the Average for Previous Years.			No. of Years Averaged, end'g with 1890.	More (+), or Less (-), in 1891 than the Average for Previous Years.	
JULY.				AUGUST.			
Av. Temp.	14	—4.14°	—4.62°	Av. Temp.	14	+.32°	+2.88°
Range of Temp.*	14	0	—1°	Range of Temp.*	14	+4°	—3°
Av. Daily Range of Temp.*	12	+.57°	—.04°	Av. Daily Range of Temp.*	12	—.18°	—.13°
Cloudiness	14	—3 per ct.	+3 per ct.	Cloudiness	14	+4 per ct.	+4 per ct.
Rainfall	14	—.68 in.	+1.08 in.	Rainfall	14	+1.22 in.	+.78 in.
Atmospheric Pressure	14	—.067in.	—.060 in.	Atmospheric Pressure	14	—.120 in.	—.133 in.
SEPTEMBER.				OCTOBER.			
Av. Temp.	14	+4.62°	+7.44°	Av. Temp.	14	—.44°	+.13°
Range of Temp.*	14	—8°	—5°	Range of Temp.*	14	+1°	+10°
Av. Daily Range of Temp.*	12	+1.84°	+2.03°	Av. Daily Range of Temp.*	12	+1.16°	+3.51°
Cloudiness	14	—13 per ct.	—15 per ct.	Cloudiness	14	—7 per ct.	—19 per ct.
Rainfall	14	—1.32 in.	—.17 in.	Rainfall	14	—1.69 in.	—3.26 in.
Atmospheric Pressure	14	—.035 in.	—.062 in.	Atmospheric Pressure	14	—.076 in.	+.077 in.
NOVEMBER.				DECEMBER.			
Av. Temp.	14	—1.92°	—4.03°	Av. Temp.	14	+6.42°	+7.46°
Range of Temp.*	14	—1°	0	Range of Temp.*	14	—14°	—4°
Av. Daily Range of Temp.*	12	—.71°	—1.07°	Av. Daily Range of Temp.*	12	+.76°	—.29°
Cloudiness	14	+12 per ct.	+19 per ct.	Cloudiness	14	—18 per ct.	—9 per ct.
Rainfall	14	+1.81 in.	+2.43 in.	Rainfall	14	—.11 in.	+.84 in.
Atmospheric Pressure	14	—.128 in.	—.064 in.	Atmospheric Pressure	14	—.148 in.	—.102 in.

* By registering thermometers.

METEOROLOGICAL CHARACTERISTICS OF THE YEAR 1891 IN MICHIGAN.

At the several meteorological stations, in different parts of the State, the average temperature for 1891 was 1.52° higher than the average for the preceding 14 years; the annual range of temperature was .12° less than in 1890, and the same as the annual average range for the preceding 14 years; the average monthly range of temperature was 4° less than in 1890, and 5° less than the average for the preceding 14 years; the average daily range of temperature was .63° greater than in 1890 and .08° less than the average for the preceding 12 years; the average cloudiness was 1 per cent less in 1891 than in 1890 and 1 per cent less than the average for the preceding 14 years; the rainfall (rain and melted snow) was 1.46 inches greater than in 1890 and 3.31 inches less than the average for the preceding 14 years; the average atmospheric pressure was .068 of an inch less than in 1890 and .100 of an inch less than the average for the preceding 14 years.

EXHIBIT 7.—*Statements of Meteorological Conditions in the Year and in each Month of the Year 1891, Compared with Annual and Monthly Averages for 1890, and for several stated Periods of Years—from Observations by Prof. R. C. Kedzie,* **at the State Agricultural College, near Lansing, Michigan.**

Meteorological Conditions.	1891 Compared with Averages for Previous Years.		In 1891	Meteorological Conditions.	1891 Compared with Averages for Previous Years.		In 1891
	No. of Years Averaged, end'g with 1890.	More (+), or Less (-), in 1891 than the Average for Previous Years.	More (+), or Less (-), than in 1890.		No. of Years Averaged, end'g with 1890.	More (+), or Less (-), in 1891 than the Average for Previous Years.	More (+), or Less (-), than in 1890.
YEAR 1891.				YEAR 1890. *Continued.*			
Av. Temp.	27	+.90°	—.22°	Cloudiness	27	—4 per ct.	—1 per ct.
Range of Temp.*	18	—11°	0	Rainfall	27	—6.92 in.	—7.14 in.
Av. Monthly Range of Temp.*	18	—2°	+1°	Atmospheric Pressure	16	+.033 in.	+.016 in.
Av. Daily Range of Temp.*	17	—.81°	+.32°				
JANUARY.				FEBRUARY.			
Av. Temp.	27	+4.80°	—4.84°	Av. Temp.	27	+2.82°	—4.94°
Range of Temp.*	18	—10°	—11°	Range of Temp.*	18	—2°	+9°
Av. Daily Range of Temp.*	17	—4.15°	—2.94°	Av. Daily Range of Temp.*	17	—3.15°	+1.90°
Cloudiness	27	—3 per ct.	—2 per ct.	Cloudiness	27	+3 per ct.	—1 per ct.
Rainfall	27	—1.04 in.	—1.49 in.	Rainfall	27	+.16 in.	+.41 in.
Atmospheric Pressure	16	—.004 in.	—.067 in.	Atmospheric Pressure	16	—.031 in.	—.031 in.
MARCH.				APRIL.			
Av. Temp.	27	—1.61°	+1.15°	Av. Temp.	27	+1.67°	+.32°
Range of Temp.*	18	—4°	0	Range of Temp.*	18	—2°	+4°
Av. Daily Range of Temp.*	17	—4.07°	—1.64°	Av. Daily Range of Temp.*	17	—1.21°	—2.57°
Cloudiness	27	+10 per ct.	+15 per ct.	Cloudiness	27	—1 per ct.	+9 per ct.
Rainfall	27	—.03 in.	+.87 in.	Rainfall	27	—.64 in.	—1.46 in.
Atmospheric Pressure	16	+.082 in.	+.040 in.	Atmospheric Pressure	16	+.004 in.	—.095 in.
MAY.				JUNE.			
Av. Temp.	27	—2.27°	+2.01°	Av. Temp.	27	—.21°	—3.00°
Range of Temp.*	18	—2°	—1°	Range of Temp.*	18	—1°	—2°
Av. Daily Range of Temp.*	17	—1.56°	+2.56°	Av. Daily Range of Temp.*	17	—.62°	+.43°
Cloudiness	27	—15 per ct.	—22 per ct.	Cloudiness	27	0	0
Rainfall	27	—1.56 in.	—3.35 in.	Rainfall	27	—1.55 in.	—1.37 in.
Atmospheric Pressure	16	+.121 in.	+.192 in.	Atmospheric Pressure	16	+.009 in.	—.008 in.

* By registering thermometers, set at 7 A. M., and recorded at 7 A. M., for the preceding calendar day.

Comments on Exhibit 7 are printed on page 11.

The high temperature for December, and the small amount of rainfall for the year 1891, are especially noticeable.

EXHIBIT 7.—CONTINUED.—*Meteorological Conditions at the Agricultural College, in Months, for the Year 1891, compared with Averages for Corresponding Months in Preceding Years.*

Meteorological Conditions.	1891 Compared with Averages for Previous Years.		In 1891	Meteorological Conditions.	1891 Compared with Averages for Previous Years.		In 1891
	No. of Years Averaged, end'g with 1890.	More (+), or Less (-), in 1891 than the Average for Previous Years.	More (+), or Less (-), than in 1890.		No. of Years Averaged, end'g with 1890.	More (+), or Less (-), in 1891 than the Average for Previous Years.	More (+), or Less (-), than in 1890.
JULY.				AUGUST.			
Av. Temp.	27	—6.22°	—5.57°	Av. Temp.	27	—.69°	+2.48°
Range of Temp.*	18	—3°	—4°	Range of Temp.*	18	+3°	—6°
Av. Daily Range of Temp.*	17	—2.74°	—2.22°	Av. Daily Range of Temp.*	17	—1.73°	—1.56°
Cloudiness	27	—8 per ct.	+4 per ct.	Cloudiness	27	—2 per ct.	+2 per ct.
Rainfall	27	—1.37 in.	+.96 in.	Rainfall	27	+2.09 in.	+1.22 in.
Atmospheric Pressure	16	+.036 in.	+.003 in.	Atmospheric Pressure	16	+.040 in.	—.002 in.
SEPTEMBER.				OCTOBER.			
Av. Temp.	27	+4.92°	+7.34°	Av. Temp.	27	+.70°	—.31°
Range of Temp.*	18	—5°	—9°	Range of Temp.*	18	+6°	+12°
Av. Daily Range of Temp.*	17	+2.44°	+2.03°	Av. Daily Range of Temp.*	17	+6.08°	+8.16°
Cloudiness	27	—13 per ct.	—13 per ct.	Cloudiness	27	—8 per ct.	—19 per ct.
Rainfall	27	—1.81 in.	—.57 in.	Rainfall	27	—1.78 in.	—3.75 in.
Atmospheric Pressure	16	+.093 in.	+.019 in.	Atmospheric Pressure	16	+.062 in.	+.164 in.
NOVEMBER.				DECEMBER.			
Av. Temp.	27	—1.74°	—5.16°	Av. Temp.	27	+8.46°	+8.05°
Range of Temp.*	18	+4°	+16°	Range of Temp.*	18	—11°	+3°
Av. Daily Range of Temp.*	17	—.44°	—1.44°	Av. Daily Range of Temp.*	17	+1.42°	+1.11°
Cloudiness	27	+14 per ct.	+23 per ct.	Cloudiness	27	—19 per ct.	—6 per ct.
Rainfall	27	+1.06 in.	+1.04 in.	Rainfall	27	—.46 in.	+.35 in.
Atmospheric Pressure	16	+.002 in.	+.003 in.	Atmospheric Pressure	16	—.024 in.	—.032 in.

* By registering thermometers, set at 7 A. M., and recorded at 7 A. M., for the preceding calendar day.

In Exhibit 6, pages 7 and 8, is given by year and months, a comparison of conditions in 1891, in Michigan, with those in 1890, and with the averages for periods of years. December, January, September, February, April, June and August (naming the months in the order of greatest difference) were the months in which the average temperature in 1891 was higher than the average for corresponding months in the preceding 14 years; July, November, May, March and October were months in which the average temperature in 1891 was lower than the average for corresponding months in the preceding 14 years.

METEOROLOGICAL CHARACTERISTICS OF THE YEAR 1891, AT ONE CENTRAL STATION.

At the State Agricultural College, near Lansing, and near the center of the thickly settled part of the State, the average temperature for 1891 was .22° lower than for 1890, and .90° higher than the average for the preceding 27 years; the annual range of temperature was the same as in 1890, and 11° less than the annual average range for the preceding 18 years; the average monthly range of temperature was 1° greater than in 1890, and 2° less than the average for the preceding 18 years; the average daily range of temperature was .32° greater than in 1890, and .81° less than the average for the preceding 17 years; the average cloudiness was 1 per cent less than in 1890, and 4 per cent less than the average for the preceding 27 years; the rainfall (rain and melted snow) was 7.14 inches less than in 1890, and 6.92 inches less than the average for the preceding 27 years; the average atmospheric pressure was .016 of an inch greater than in 1890, and .033 of an inch greater than the average for the preceding 16 years.

In Exhibit 7, pages 9 and 10, is given by year and months, a comparison of conditions in 1891, at the Agricultural College, with those in 1890, and with averages for periods of years. December, September, January, February, April and October (naming months in order of greatest difference) were months in which the average temperature in 1891 was higher than the average for corresponding months in the preceding 27 years; July, May, November, March, August and June were months in which the average temperature in 1891 was lower than the average for corresponding months in the preceding 27 years, at that station which is near the central part of the State.

Whoever will carefully study Diagram No. 1 (p. 22) in this article, and in similar articles for preceding years, will see that thermometers and methods of observation have become so perfect that, given a curve representing correctly the temperature by months at one station in Michigan, curves can readily be constructed without actual records, which will somewhat closely represent the temperature at each of several other stations, because the curves for many stations run so nearly parallel that all that is necessary to do is to find the average difference of mean annual temperature at the station to be represented compared with the station for which the data are given. It may also be seen that a curve representing the temperature at a station in the central part of the State very closely resembles the curve representing the average for many stations representing nearly all parts of the State. This proves that the practice adopted many years ago of stating the meteorological characteristics at one central station is a reasonably safe practice, and it is especially useful when it enables us to gain a comparison for a longer period than can be made from records at many stations, and also when employed in advance of the receipt of records from all stations, as is the case when the weekly bulletins of "Health in Michigan" are issued, for the purposes, for which the meteorological conditions at the State Capitol are used to represent the conditions probably prevailing throughout the State.

LOCAL METEOROLOGICAL PHENOMENA IN THE SEVERAL MONTHS OF THE YEAR 1891.

The following general remarks relative to temperature, frosts, effects on vegetation, migration of birds, etc., in 1891, are taken from the monthly reports by observers. The names of stations are appended; the names of observers are stated in Exhibit 1, page 3.

JANUARY.

Jan. 3, first day temperature below zero. Jan. 15, depth of snow on ground, 7 inches; Jan. 31, 19 inches.—*Gulliver Lake.*

Light frosts, Jan. 4, 28. Heavy frosts, Jan. 5, 7, 8, 9, 10. Melting snow on ground Jan. 1, 7, 10, 11, 17, 18, 19, 20, 21, 27, 28, 29, 30, 31. Ground frozen about 6 inches, Jan. 31.—*Alpena.*

Melting snow on ground, Jan. 15, 18, 19, 21, 25, 27, 28, 29.—*Grand Haven.*

Melting snow on ground, Jan. 20.—*Port Huron.*

January was a cloudy month but not stormy—only two clear days. No sleighing. Very smooth roads. Ice on still water about 10 inches at the close; frost in the ground in open places 7 or 8, in swamps hardly anything. The mean temp. was not as high as in Jan., 1890, but still 5° or 6° above the normal. It did not freeze at night, Jan. 31.—*Thornville.*

Frosts, Jan. 4, 5, 6, 7, 8, 9, 11, 12, 14, 15, 20, 22, 25, 26, 30, 31. Snow on ground, in patches, Jan. 16. No snow on ground, Jan. 31.—*Lansing.*

Wild geese seen, Jan. 2. Bees were out, Jan. 30.—*Parkville.*

FEBRUARY.

Melting snow on ground, Feb. 14, 16, 23, 24. Average depth of snow on ground, 28 inches, Feb. 15; 32 inches, Feb. 28.—*Rockland.*

Average depth of snow on ground, 22 inches, Feb. 15; 28 inches, Feb. 28.—*Marquette.*

Snow on ground, 18 inches, Feb. 15; 17 inches, Feb. 28.—*Gulliver Lake.*

Light frosts, Feb. 11, 15, 19, 27. Heavy frosts, Feb. 26. Melting snow on ground, Feb. 6, 9, 11, 12, 13, 14, 15, 16, 19, 20, 21, 23, 24, 25.—*Alpena.*

Melting snow on ground, Feb. 5, 6, 7, 9, 11, 12.—*Grand Haven.*

Melting snow on ground, Feb. 1. Trees loaded with ice, Feb. 17. February, during its first half was a continuation of the Jan. drought. The latter half had heavy precipitation. There was no sleighing. Frost in the ground at close, 10 inches.—*Thornville.*

Ground bare, Feb. 15; ¾ inch snow, Feb. 28.—*Tecumseh.*

This month has been unusually fine. From the 14th to the last day of the month various song birds have been present in great numbers. One peculiarity of the month has been that the winds from the north have not been very cold, and some of them have been very pleasant. No thunder or lightning.—*Birmingham.*

Frosts Feb. 5, 7, 12, 15, 20, 22, 25, 26, 27. First robin seen, Feb. 5. Ground bare, Feb. 14; ½ inch snow on ground, Feb. 28. Ice went out of Grand River on night of Feb. 17.—*Lansing.*

First robin seen, Feb. 16. Bees were out, Feb. 6, 12, 13, 14, 15, 16, 17, 24.—*Parkville.*

MARCH.

Average depth of snow on ground, 26 inches, Mar. 15; 14 inches, Mar. 31.—*Marquette.*

Total depth of snow on ground, 2 inches, Mar. 15. Navigation opened, Mar. 29. No snow on ground, Mar. 31.—*Manistee.*

Average depth of snow on ground, 4 inches, Mar. 4. No snow on ground, Mar. 31.—*Alpena.*

Average depth of snow on ground, .01 inch, Mar. 15. No snow on ground, Mar. 31.—*Grand Haven.*

Average depth of snow on ground, 4½ inches, Mar. 15. Navigation opened, Mar. 31. No snow on ground, Mar. 31.—*Port Huron.*

Melting snow on ground, Mar. 8, 28, 29. First robin seen, Mar. 11; first bluebird and meadow lark, Mar. 21; first killdeer and song sparrow, Mar. 23. Did not freeze at night, Mar. 30 and 31. March was essentially a winter month with a heavy snowfall which would have made considerable sleighing if it had not drifted. The frost in the ground was deeper at the close than at its beginning. As far as can be judged the wheat has wintered remarkably well, and peach buds seem to be all right.—*Thornville.*

First crows seen, Mar. 20; phœbe birds seen, Mar. 29. Depth of snow on ground, Mar. 15, 23 inches Mar. 30, 6 inches.—*Gulliver Lake.*

Frost, Mar. 29.—*Albion.*

Depth of snow on ground, 6½ inches, Mar. 15; no snow on ground, Mar. 31.—*Tecumseh.*

Navigation opened, Mar. 25. No snow on ground, Mar. 15 and 31.—*Detroit.*

Frosts, Mar. 1, 3, 5, 6, 10, 12, 14, 17, 25, 26, 29, 30. Grand River closed about Mar. 8; opened night of Mar. 11. Depth of snow on ground, about 2 inches, Mar. 16; no snow on ground, Mar. 31.—*Lansing.*

Wild geese seen, Mar. 28; frogs, Mar. 28.—*Parkville.*

APRIL.

Much snow in the woods; birch trees in blossom, April 14. House flies, mosquitoes and a toad seen, Apr. 16. River ice has gone out, Apr. 17. Robins, butterflies and frogs were out, Apr. 20. Young poplars and maples in blossom. Farmers are plowing. There is still snow in the fence corners, Apr. 24. Lilac bushes and young poplars in leaf, Apr. 30.—*Rockland.*

Average depth of snow on ground, 18 inches, April 15. No snow on ground, Apr. 30.—*Marquette.*

No snow on ground, Apr. 15 and 30.—*Manistee.*

Average depth of snow on ground, Apr. 15 and 30, none.—*Alpena.*

No snow on ground, Apr. 15 and 30.—*Grand Haven.*

Light frost, Apr. 20. Killing frost, Apr. 25. No snow on ground, Apr. 15 and 30.—*Port Huron.*

First robin seen, Apr. 9. First day minimum temp. above 30°, Apr. 10. First frogs appeared, Apr. 17; wild geese, Apr. 25; spring beauties in blossom. Ice broke up in Gulliver Lake, Apr. 26.—*Gulliver Lake.*

Frosts, Apr. 24, 25, 26. Raspberry, blackberry and lilac buds opening, April 19. Juneberry in blossom, Apr. 11. Apple, cherry and tamarack leafing, Apr. 26. Maples in blossom, Apr. 29. Phœbe birds, brown thrush and chewink return, April 28. April was a dry month—the last half a drouth—warmer than the average. The appearance of wheat and clover is promising. Fruit buds are uninjured as yet. The growth of vegetation has been rapid, in spite of the dry weather.—*Thornville.*

Frosts, Apr. 7, 8, 25, 28, 29. Hail, Apr. 9.—*Albion.*

No snow on ground, Apr. 15 and 30.—*Detroit.*

Frosts, Apr. 5, 7, 8, 9, 25, 29 Cherry trees in bloom, Apr. 26.—*Lansing.*

Frosts, Apr. 7, 8, 25, 29.—*Parkville.*

Frosts, 25. 29. Peach, plum and cherry trees in bloom at end of month.—*Birmingham.*

MAY.

Maples in full leaf, plum trees in blossom, May 12. Copper mine temperature, May 15:—depth 1100 ft., temp. 49°, thermometer in loose, damp ground. Depth, 1200 ft., temp. 49°, thermometer in wet clay. Depth, 1300 ft., 53°, thermometer against rock. Depth, 1400 ft., 54°, thermometer in water.—*Rockland.*

Frosts, May 2, 3, 4, 5, 6, 7, 10, 11, 14, 16, 17, 22, 23, 26.—*Marquette.*

Frosts, May 17, 26. 27.—*Manistee.*

Frosts, May 11, 12, 13, 14, 16. 17, 22, 23, 26.—*Gulliver Lake.*

Frosts, May 5, 6, 7, 8, 17.—*Grand Haven.*

Frosts, May 5, 17.—*Port Huron.*

Nights that froze, May 2, 3, 4, 5, 6, 7, 15, 16. The frost of May 17 killed all kinds of tender vegetation—hurt wheat on low and new lands badly, and clover a little—peaches some on low lands. Cherries and apples escaped injury. Four acres of onions in Metamora, on reclaimed swamp land, were killed and had to be replanted. Peaches and sweet cherries in blossom, May 1; maples leafing, May 2; yellow oak and beech leafing, May 5; strawberries and dandelions in blossom; plums and sour cherries in blossom, May 8; apples in blossom, May 14; white oak leafing and corn planting began, May 12. Catbirds and orioles return, May 8; bobolinks, May 9; whippoor-wills and barn swallows, May 18. May was cooler than the average for the month and dry till the heavy rain of the 21st broke the drought. The nights have been so cool that the growth of vegetation has been slow.—*Thornville.*

Frosts, May 1, 5, 7. Killing frosts, May 17, 26.—*Albion.*

Frosts, May 5, 26.—*Marshall.*

Heavy ice in standing vessels; some on ponds; ground frozen; potatoes and asparagus frozen down to the ground; fruit considerably damaged, May 5. Hard frost extending to tops of high hills, May 7. Hard frost doing much damage to strawberries and early potatoes; the leaves and twigs on low growing oak trees are largely killed; clover is damaged to some extent; ice ½ inch thick in vessels containing water, May 17. Heavy frost doing much injury to potatoes and other tender vegetables, May 26.—*Birmingham.*

Frosts, May 5, 7, 17, 27.—*Detroit.*

Frosts, May 3, 5, 6, 7, 12. Killing frosts, May 17, 27. Ice formed, May 5, 6.—*Lansing.*

Frosts, May 1, 5, 6, 7, 12, 13, 14, 15, 17, 18, 19, 27, 28.—*Parkville.*

JUNE.

Copper mine temperature, June 13:—depth, 1400 ft., temp., 55°, thermometer bulb in loose dirt. Depth, 1300 ft., 50°. Depth, 1200 ft., 48°. Depth, 1100 ft., 48°, thermometer bulb in water. Lights, compressed air blast and steam would account for the difference.—*Rockland.*

Frosts, June 4, 5, 6.—*Marquette.*

Frosts, June 4, 5, 6.—*Sault Ste. Marie.*

In spite of the deficiency in the rainfall, vegetation made very good growth all the month; but fallow plowing was hard and dry. The result shows that the May frosts did extensive damage to grass, wheat and fruit—greatest to June clover and apples—clover being very short and apples pretty much a failure. The month was notable for its healthfulness. There was but little oppressively hot weather and the nights were generally cool.—*Thornville.*

Light frost, June 5.—*Gulliver Lake.*

Killing frost, June 4.—*Albion.*

Frost, June 5.—*Detroit.*

Wheat heading out, June 2. Frost, June 5.—*Lansing.*

JULY.

Destructive forest fires July 7 to 11. Frost, July 20.—*Gulliver Lake.*

Heavy frosts in the valleys, July 7, 8, 18, 19. Good sized streams have been dry all the month.—*Rockland.*

Light frost, July 20.—*Marquette.*

Light frosts, July 18, 19, 20, 25. Killing frost, July 8.—*Sault Ste. Marie.*

Light frosts, July 20, 31.—*Alpena.*

Light frost, July 31.—*Grand Haven.*

July was notable for its low temperature, the mercury having reached 90° but once and fallen below 55° thirteen times—four times below 50°. Wheat harvest began, July 12. Some threshing done before the month closed; the yield being fair and the quality excellent. Corn has made fair growth in spite of the cool weather and promises well. Oats cutting began, July 26; the crop being large. Apples are a failure.—*Thornville.*

Frosts, July 19, 25, 27; damaged corn and potatoes on low ground.—*Marshall.*

Light frosts, July 25, 27.—*Sergt. N. B. Conger, Lansing.*

AUGUST.

Copper mine temperature, Aug. (day of month not given); depth, 1500 ft., temp., 53°. Depth, 1400 ft., 58°. Depth, 1100 ft., 50°. Thermometer bulb in water.—*Rockland.*

Light frosts, Aug. 29, 30, 31.—*Sault Ste. Marie.*

Light Frost, Aug. 29.—*Alpena.*

Except about a week of very hot weather, the month was cool for the season and the nights very cool. The latter half was so wet that oats and peas suffered to considerable extent, but it was very favorable to young seeding, pastures and potatoes. It was too cool for the rapid growth of corn.—*Thornville.*

SEPTEMBER.

Maple leaves turning, Sept. 12. Copper mine temp., Sept. 7: Depth, 1100 ft., temp., 50°. Depth, 1200 ft., 49°. Depth, 1300 ft., 50°. Depth, 1400 ft., 52°. Thermometer bulb in water.—*Rockland.*

Light frost, Sept. 4.—*Marquette.*

Light frost, Sept. 1. Killing frosts, Sept. 5, 30.—*Sault Ste. Marie.*

Light frosts, Sept. 4, 30.—*Manistee.*

Light frosts, Sept. 4, 30.—*Alpena.*

Light frosts, Sept. 4, 30.—*Grand Haven.*

The first half of the month cool and dry; the last half hot and dry. Mean considerably above the normal. No killing frost. Wheat is likely to get a big top before winter comes, and be damaged by the fly.—*Thornville.*

Light frost, Sept. 9.—*Albion.*

Light frost, Sept. 29.—*Battle Creek.*

Light frosts, Sept. 8.—*Detroit.*

Light frost, Sept. 8, first of season. Light frosts Sept. 9, 30.—*Lansing.*

Light frost, Sept. 8, first of season.—*Parkville.*

Light frost, Sept. 4, first of season. Maple leaves commence to turn.—*Gulliver Lake.*

OCTOBER.

Copper mine temperature, Oct. 16: Depth, 1500 ft., temp., 53°. Depth, 1400 ft., 53°. Depth, 1300 ft., 50°. Thermometer bulb in water. Snow squalls, Oct. 14.—*Rockland.*

Light frosts, Oct. 6, 7, 8, 9, 12, 13. Killing frosts, Oct. 11, 16, 20. Depth of snow on ground, trace, Oct. 31.—*Marquette.*

Killing frosts, Oct. 5, 11, 12.—*Manistee.*

Black frost, Oct. 23. Killing frosts, Oct. 6, 9.—*Alpena.*

Light frosts, Oct. 6, 8. Killing frosts, Oct. 9, 12.—*Grand Haven.*

Light frosts, Oct. 6, 10. Killing frost, Oct. 12.—*Port Huron.*

Light frosts, Oct. 6, 9, 10. Killing frosts, Oct. 13, 15, 16, 21, 22.—*Detroit.*

Light frosts, Oct. 8, 9, 10, 11, 15, 16, 17. Heavy frosts, Oct. 12, 13, 21, 22, 23, 24, 25, 26, 27, 28, 29. Fall of leaves: Butternut, Oct. 1, black walnut and basswood, Oct. 5, maple and elm, Oct. 15. Yellow birds last seen, Oct. 15, robins, Oct. 18, young blackbirds, Oct. 27. October was a dry month although there was a considerable rainfall badly distributed—unfavorable for the growth of wheat owing to the dryness of the ground and the wintry character of the nights in the last half. Wheat is not looking well, especially the early sowed, which is nearly destroyed by the insect, there having been no frost in September sufficient to kill the fly.—*Thornville.*

Killing frosts, Oct. 8, 12, 13. Ice formed, ¼ inch, Oct. 23; ½ inch, Oct. 28.—*Albion.*

Heavy frost, Oct. 28.—*Ann Arbor.*

Frost, Oct. 8.—*Marshall.*

Light frost, Oct. 5. First killing frost, Oct. 6. First day temp. below 32°, Oct. 6. Wild geese flying south, Oct. 10, 25. Ground frozen ½ inch, Oct. 11. Last robin seen, Oct. 21. First snow squalls, Oct. 26.—*Gulliver Lake.*

Frosts, Oct. 1, 8, 10. Killing frost, Oct. 17. Ground frozen for first time this season, Oct. 7. Ice formed Oct. 8, 12, 13, 19, 23, 24; leaves falling fast. Wild geese flying southeast, Oct. 24.—*Lansing.*

First killing frost, Oct. 8. Wild geese seen, Oct. 22.—*Parkville.*

NOVEMBER.

November was colder than the normal by about 3 degrees, with a heavy rainfall and considerable snow but not enough to make good sleighing—about 4 inches at close.—*Thornville.*

Killing frosts, Nov. 2, 3, 4.—*Albion.*

Depth of snow on ground, 6¼ inches, Nov. 30.—*Tecumseh.*

Average depth of snow on ground, 1 inch, Nov. 15; 3 inches, Nov. 30.—*Marquette.*

Average depth of snow on ground, 2 inches, Nov. 15; 4 inches, Nov. 30.—*Sault Ste. Marie.*

Average depth of snow on ground, 3 inches, Nov. 30.—*Manistee.*

Trace of snow on ground, Nov. 30.—*Alpena.*

Average depth of snow on ground, 1 inch, Nov. 30.—*Grand Haven.*

Average depth of snow on ground, 4 inches, Nov. 30.—*Port Huron.*

Average depth of snow on ground, trace, Nov. 15; 5 inches, Nov. 30.—*Detroit.*

Snow flakes flying, Nov. 1. Frost, Nov. 1, 11. Ice formed, Nov. 2, 3, 4, 13, 14, 24, 29, 30. Grand river closed, first time this season, Nov. 29; 3 inches of snow on ground, Nov. 30.—*Lansing.*

First day average temp. below 32°, Nov. 1. First ice on Gulliver Lake, Nov. 3. Wild geese flying south, Nov. 20. First day maximum temp. below 32°, Nov. 25. Gulliver Lake frozen solid, Nov. 27.—*Gulliver Lake.*

DECEMBER.

Closing of navigation, Dec. 2. Average depth of snow on ground, 12 inches, Dec. 15; 1 inch Dec. 31.—*Marquette.*

Closing of navigation, Dec. 8. Average depth of snow on ground, 7 inches, Dec. 15; 4 inches, Dec. 31. The month has been warmer than any December since the establishment of the station. The precipitation for the month has exceeded the average .95 inch, for the year .04 inch. The total movement of the wind, 8,655 miles, is greater than any previous month of December since the opening of the station.—*Sault Ste. Marie.*

No snow on ground, Dec. 15 and 31. Navigation, so far as barges and sailing vessels are concerned, closed about Dec. 5, although two or three vessels cleared from port since then. The harbor, however, remains open all winter and the F. & P. M. line of steamers come in all the year round.—*Manistee.*

Closing of navigation, Dec. 10. Average depth of snow on ground, 4 inches, Dec. 15; 1 inch, Dec. 31.—*Alpena.*

Closing of navigation; river and harbor open throughout month. No snow on ground, Dec. 15 and 31.—*Grand Haven.*

Closing of navigation, Dec. 22. No snow on ground, Dec. 15 and 31.—*Port Huron.*

Closing of navigation, Dec. 10. No snow on ground, Dec. 15 and 31.—*Detroit.*

Frosts, Dec. 11, 12, 13, 17, 18, 19, 20, 21, 23, 24, 28, 30. Grand River open Dec. 4; closed, Dec. 7; opened, Dec. 14, closed Dec. 18, opened, Dec. 22. No snow on ground, Dec. 15 and 31.—*Lansing.*

Bees were out, Dec. 3, 11, 12, 13, 14, 15.—*Parkville.*

A warm December with many clear and fair days. No sleighing; snow enough fell but did not lie. No frost to speak of in the ground at close. Not favorable for wheat.—*Thornville.*

Depth of snow on ground, Dec. 15, 3 inches; no snow on ground, Dec. 31. Ice on Gulliver Lake, 8 inches thick, Dec. 31; no ice on Lake Michigan at close of month.—*Gulliver Lake.*

MEASUREMENTS AND TEMPERATURE OF GROUND WATER.

In a paper entitled "Typhoid Fever and Low Water in Wells," on pages 89–114 of the Report of this Board for 1884, it is shown that for the years 1878–82 there was a relation between the sickness and deaths from typhoid fever in Michigan and the depth of water in wells. In the month of October, when the water in wells reached the lowest point in the year, there were the most deaths and sickness from typhoid fever; and following the month of April, when the water in wells was highest, there were the least deaths and sickness from typhoid fever. When this comparison is made in a diagram, it is found that, "beginning with June in each year the curve representing sickness from typhoid fever follows more or less closely the curve representing the average depth of earth above the ground water."

On page 256, of the Report of this Board for the year 1889, is a diagram exhibiting the relation of typhoid fever to low water in wells, in Michigan, for the 10 years, 1878 and 1880–88.

On page 229 of the Report for 1891 is a diagram exhibiting the relation of typhoid fever to low water in wells, in Michigan, for the twelve years, 1878 and 1880–90.

Typhoid fever being one of the most important causes of death in Michigan, it is of very great importance that further evidence be collected on this important subject.

The measurements for each month in 1891, of the depth of a well at each of five places in Michigan, are shown in Exhibit 8; also the depth of earth above the water, and the temperature of the water in each of the wells. It is hoped that these measurements and observations may continue, and permit a more extended comparison of the depth of water in wells with the sickness from typhoid fever, and with sickness and deaths from other diseases.

CHANGE OF EXPOSURE OF INSTRUMENTS AT LANSING IN 1884.

Comments on the subject of a new instrument shelter at Lansing are printed on page 21, Report for 1885. Exhibits A, B, C, and D, pages 22 and 23, of the Report for 1886, relate to that subject, and may be studied in connection with what is said on page 21, Report for 1885. The fact of the change of place of observation in 1884 may need to be taken into account by whoever studies the meteorology at Lansing through a long series of years.

EXHIBIT No. 8.—*Depth of Wells; Depth of Ground above Water in Well; Temperature of Water in Well, and day of observation of such temperature, in each month of the year 1891, as reported by Meteorological Observers for the State Board of Health, and for the United States Signal Service.*

Stations in Michigan.	January.			February.			March.			April.			May.			June.		
	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well. —Deg. F.	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well. —Deg. F.	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well. —Deg. F.	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well. —Deg. F.	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well. Deg. F.	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well. —Deg. F.
Traverse City*	55	41 6	49^{24}	55	41 6	50^{24}	55	40	45^{24}	55	40 6	48^{21}	55	41	47^{22}	55	41	47^{22}
Lansing S. B. of H.	26 11½	25 2¼	50^{16}	26 11½	25 5	49^{14}	26 11½	25 1	49^{16}	26 11½	24 6½	48^{15}	26 11½	24 6	49^{16}	26 11½	24 7⅝	49^{15}
Ann Arbor	15	11 10¾	43^{27}	15	9 6	38^{18}	15	10 8¼	40^{19}	15	7 9⅛	39^{17}	15	10 8	55^{16}	15	11 0¾	50^{20}
Battle Creek	60 9	58 9	53^{14}	60 8	58 8	53^{15}	60 8	58	53^{18}	60 9	56 6	52^{15}	60 8	54 8	50^{18}	60 8	55 8	53^{15}
Kalamazoo	25	15	48^{15}	25	15	48^{15}	------	------	------	------	------	------	------	------	------	------	------	------
Otsego	23	21 5	50^{14}	23	21 5	49^{16}	23	21 5	48^{16}	23	21 5	47^{16}	23	21 5	47^{15}	23	21 5	49^{15}
River Raisin†	23	17	46^{16}	23	17	45^{16}	23	17	44^{16}	23	15	46^{15}	23	16	48^{15}	23	15	50^{15}
Hillsdale	30 6	24 5	50^{15}	30 6	24 11	50^{15}	30 6	22 10½	49^{15}	30 6	20 10	49^{15}	30 6	22	49^{15}	30 6	23 1	------
Rockland	29 4	22	40^{29}	29 4	22 6	38^{28}	29 4	22 10	38^{16}	29 4	22 6	39^{17}	29 4	21 10	41^{15}	29 4	23 6	42^{19}

NOTE.—The small figures above and at the right of the numbers denoting the degrees of temperature, state the day of the month on which the observation was made.
* At Northern Michigan Asylum, W. H. Bauld, observer.
† D. W. Palmer, observer.

EXHIBIT No. 8.—*Depth of Wells, etc.*—CONTINUED.

Stations in Michigan.	July.			August.			September.			October.			November.			December.		
	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well. —Deg. F.	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well. —Deg. F.	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well. —Deg. F.	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well. —Deg. F.	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well. —Deg. F.	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well. —Deg. F.
Traverse City*	55	41 6	46^{22}	55	40 10	46^{21}	55	41 9	48^{21}	55	40	48^{21}	55	42	48^{30}	55	41 6	48^{21}
Lansing S. B. of H.	26 11½	24 8¾	49^{17}	26 11½	25	50^{17}	26 11½	24 11½	51^{15}	26 11½	25 8¾	51^{16}	26 11½	25 5½	51^{16}	26 11½	25 5½	51^{16}
Ann Arbor	15	12 10	57^{22}	15	12 6	41^{15}	15	13 7½	59^{15}	15	13 6½	56^{17}	15	13 9	52^{17}	15	12 6	43^{17}
Battle Creek	60 9	55 1	52^{20}	60 9	57 8	52^{16}	60 8	57 8	52^{15}	60 8	57 8	48^{17}	60 8	51 2	50^{17}	60 8	57 8	50^{18}
Kalamazoo	.....	.....	.....	.....	.....	.....	25	15	52^{15}	25	15	50^{15}	25	15	48^{15}	25	15	48^{15}
Otsego	23	21 5	49^{15}	23	21 5	50^{16}	23	21 5	49^{15}	23	21 5	53^{15}	.....	.....	.....	.....	.....	.....
River Raisin†	23	17	52^{15}	23	17 6	48^{15}	23	17	52^{15}	23	15	45^{15}	23	16	48^{16}	23	17	44^{15}
Hillsdale	30 6	24	48^{15}	30 6	25	50^{15}	30 6	25 10	50^{15}	30 6	26 7	50^{15}	30 6	26 6	50^{15}	30 6	24	50^{15}
Rockland	.....	.....	.....	29 4	25 7½	44^{17}	29 4	23 6	45^{14}	29 4	25 3	45^{16}	.....	.....	.....	.....	.....	.....

NOTE.—The small figures above and at the right of the numbers denoting the degrees of temperature, state the day of the month on which the observation was made.
* At Northern Michigan Asylum, W. H. Bauld, observer.
† D. W. Palmer, observer.

TEMPERATURE OF THE ATMOSPHERE.

EXHIBIT 9.—*Average Temperature by Year and Months in 1891,* compared with Annual and Monthly Averages for 1890, and for the 14 Years, 1877–1890. These Averages are for Groups of Several Stations in Michigan.*

Years, etc.	Average Temperature—Degrees Fahr.											
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 14 years, 1877-90...	46.09	21.17	23.43	29.48	44.25	56.00	65.61	70.81	67.84	60.88	49.45	36.49	27.69
Av. 13 years, 1879-90...	45.61	20.84	22.17	28.78	43.37	55.93	65.49	70.36	67.36	60.37	49.11	36.24	27.35
1890 (12 stations).....	46.99	30.06	30.07	27.47	45.23	52.41	69.93	71.29	65.28	58.06	48.88	38.60	26.65
1891 (11 stations).....	47.61	26.90	27.33	28.93	47.11	55.40	67.62	66.67	68.16	65.50	49.01	34.57	34.11
In 1891 Higher than Av. for 14 years, 1877-90.....	1.52	5.73	3.90	.....	2.86	.....	2.01	.....	.32	4.62	.....	.....	6.42
In 1891 Lower than Av. for 14 years, 1877-90.....	.....	.....	.....	.55	.....	.60	.....	4.14	.....	.....	.44	1.92	.....

NOTE.—The stations represented in the lines for average temperature for the years 1877-90 in Exhibit 9, are the following: Port Austin for 1885, 1888, 1889; Mendon for 1877-82; Nirvana for 1877-79 and first four months of 1880; Reed City for last eight months of 1880 and 1881-85; Kalamazoo for 1877-89; Coldwater, Ypsilanti, Woodmere Cemetery (near Detroit), for 1877-79; Otisville for 1878-80, 1882; Niles for 1878-79, 1881; Washington for 1879-81; Benton Harbor for 1877-78; Petoskey for 1878-79; Parkville for 1881-82; Hillsdale for 1882-84; Winfield for 1881, 1883; Mallory Lake for first seven months of 1881, Hudson for last five months of 1881; Ionia for 1883-85; Manistique, Swartz Creek, for 1884-85; Mackinaw City for 1884-87; Muskegon, Pentwater for 1886; Marquette for 1879-84, 1886-87; Escanaba for 1880-87; Alpena, Grand Haven, Port Huron for 1879-87; Detroit for 1877-87; Otsego for 1887-90; Alma for 1890; Gulliver Lake for 1887-90; Battle Creek for 1877-1880, 1882, 1885, 1888-89; Tecumseh for 1877-85, 1888-89; Harrisville for 1881-82, 1885-86, 1890; Thornville for 1877-90; Lansing for 1879-90; Agricultural College for 1877, 1881-90; Ann Arbor for 1881-90; Traverse City, Marshall for 1882-90; Birmingham for 1887-90; Albion for 1890.

* Beginning with the year 1885, allowance must be made for Lansing in Exhibit 9, because of a change in location of the instruments. The amount of the variation by months is shown in Exhibit A, on page 22, Report for 1886.

EXHIBIT 10.—*Comparison of the Average Temperature during the Year and during each Month of the Year 1891, with the Annual and with the Monthly Averages for the Year 1890, and with the Averages for the 27 Years, 1864–90. Observations made by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Michigan.*

Years, etc.	Average Temperature—Degrees Fahr.											
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 27 years, 1864-90...	46.48	21.90	23.78	30.91	45.73	57.97	67.61	71.52	68.59	60.18	48.10	35.64	26.04
1890.....	47.60	31.54	31.54	28.15	47.08	53.69	70.40	71.04	65.42	57.76	49.11	39.06	26.45
1891.....	47.38	26.70	26.60	29.30	47.40	55.70	67.40	65.30	67.90	65.10	48.80	33.90	34.50
In 1891 Higher than Av. for 27 years, 1864-90.....	0.90	4.80	2.82	.....	1.67	.....	.....	.....	.....	4.92	0.70	.....	8.46
In 1891 Lower than Av. for 27 years, 1864-90.....	.....	.....	.....	1.61	.....	2.27	0.21	6.22	0.69	.....	.....	1.74	.....
In 1891 Higher than in 1890.....	.....	.....	.....	1.15	0.32	2.01	.....	.....	2.48	7.34	.....	.....	8.05
In 1891 Lower than in 1890.....	0.22	4.84	4.94	.....	.....	.....	3.00	5.74	.....	.....	0.31	5.16	.....

TABLE I.—*Average temperature in Degrees Fahr., for the Year, and for each Month of the Year 1891, at each of 12 Stations in Michigan, and also Average lines for 11 Stations. From Observations made daily at 7 A. M., 2 P. M. and 9 P. M.,* local time, by Observers† for the State Board of Health.*

Stations in Michigan.†	Divisions of the State.‡‡	Temperature in Degrees Fahr.													
		Year.		Months,†† 1891.											
		Norm.**	1891.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 11 Stations§	.....	.....	47.61	26.90	27.33	28.93	47.11	55.40	67.62	66.67	68.16	65.50	49.01	34.57	34.11
Rockland	U. P.	.....	42.76	20.51	15.79	22.97	43.39	53.60 d	68.60	62.56 e	64.26 c	63.45 b	43 44 g	29.67 h	29.83 f
Gulliver Lake ¶	U. P.	40.30[5]	41.31	20.18	17.62	23.06	37.26	49.86	61.56	60.63	62.52	58.72	44.98	31.60	30.75
Traverse City	N. W.	43.56[9]	46.09	25.04	25.25	26.74	43.79	51.59	65.14	65.77	67.08	65.00	49.01	34.30	34.31
Harrisville	N. E.	43.37[3]	43.57	23.42	22.76	25.42	41.06	48.90	59 67	62.33	63.05	62.46	47.37	33.43	32.93
Thornville	B. & E.	47.85[15]	49.18	28.44	29.72	30.55	48.82	57.15	69.51	68.23	69.45	66.02	50.10	36.49	35.69
Agricultural College	C.	46.51[28]	47.88	26.70	26.60	29.30	47.40	55.70	67.40	65.30	67.90	65.10	48.80	33.90	34.50
Lansing, (S. B. of H.)‡	C.	47.30[13]	48.27	27.74	29.13	29.59	48.12	56.01	68.27	66.84	68.20	65.87	49.39	34.80	35.23
Otsego	S. W.	.....	¶¶	27.85	29.14	31.01	48.78	56.40	70.29	67.51	69.24	66.02	49.59	.....	.....
Albion	S. C.	49.33[2]	49.43	29.80	31.40	31.30	49.30	56.90	69.70	67.50	69.10	65.90	49.90	36.40	36.00
Ann Arbor	S. C.	46.65[11]	48.71	27.40	29.40	30.10	48.40	56.30	68.70	67.90	69.20	66.30	52.10	34.90	33.30
Battle Creek	S. C.	.....	50.52	29.41	30.52	31.24	50.40	60.11	72.67	71.69	72.18	68.49	50.50	35.36	33.66
Marshall	S. C.	48.34[9]	48.75	28.19	29.46	30.15	48.94	56.67	69.92	67.88	70.00	65.88 i	49.01	34.26	34.66
Tecumseh	S. C.	.....	‖	28.41 d	30.13	30.91	49.50 b	56.62	69.96 b	68.45	70.27 a	61.76 b	.....	35.08	34.74 a
Birmingham	S. E.	47.36[5]	49.04	29.26	30.59	30.88	48.55	56.42	69.23	67.34	69.30	66.08	49.48	36.78	34.60

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

a For 30 days. b For 29 days. c For 28 days. d For 27 days. e For 26 days. f For 23 days. g For 18 days. h For 16 days. i For 15 days.

* The daily averages are one-third the sum of these three observations.

† The names of observers, their place of observation, and the counties in which these places are situated, are stated in Exhibit 1, page 3.

§ This line is an average for only the 11 stations from which statements nearly complete were received for every month of the year. It does not include Otsego and Tecumseh.

¶ The line for Gulliver Lake is not included in the "Average for 11 Stations;" the registers were received too late.

** Numbers in this column state the average annual temperature for periods of years ending in each case with December, 31, 1891. The small figures above and at the right of numbers which state the temperature, denote the number of years included in the average.

†† The computations of Av. Temp., as tabulated for months in 1891 were made at the following stations: Albion and Ann Arbor. All other computations in Table I. were made at the office of the State Board of Health.

‡ Beginning with the year 1885, allowance must be made for Lansing in Table I., because of a change in the location of the instruments. The amount of the variation by months is shown in Exhibit A, on page 22, Report for 1886.

‡‡ The names of divisions, and the counties in each, are stated in Exhibit I., in a paper which follows on weekly reports of sickness.

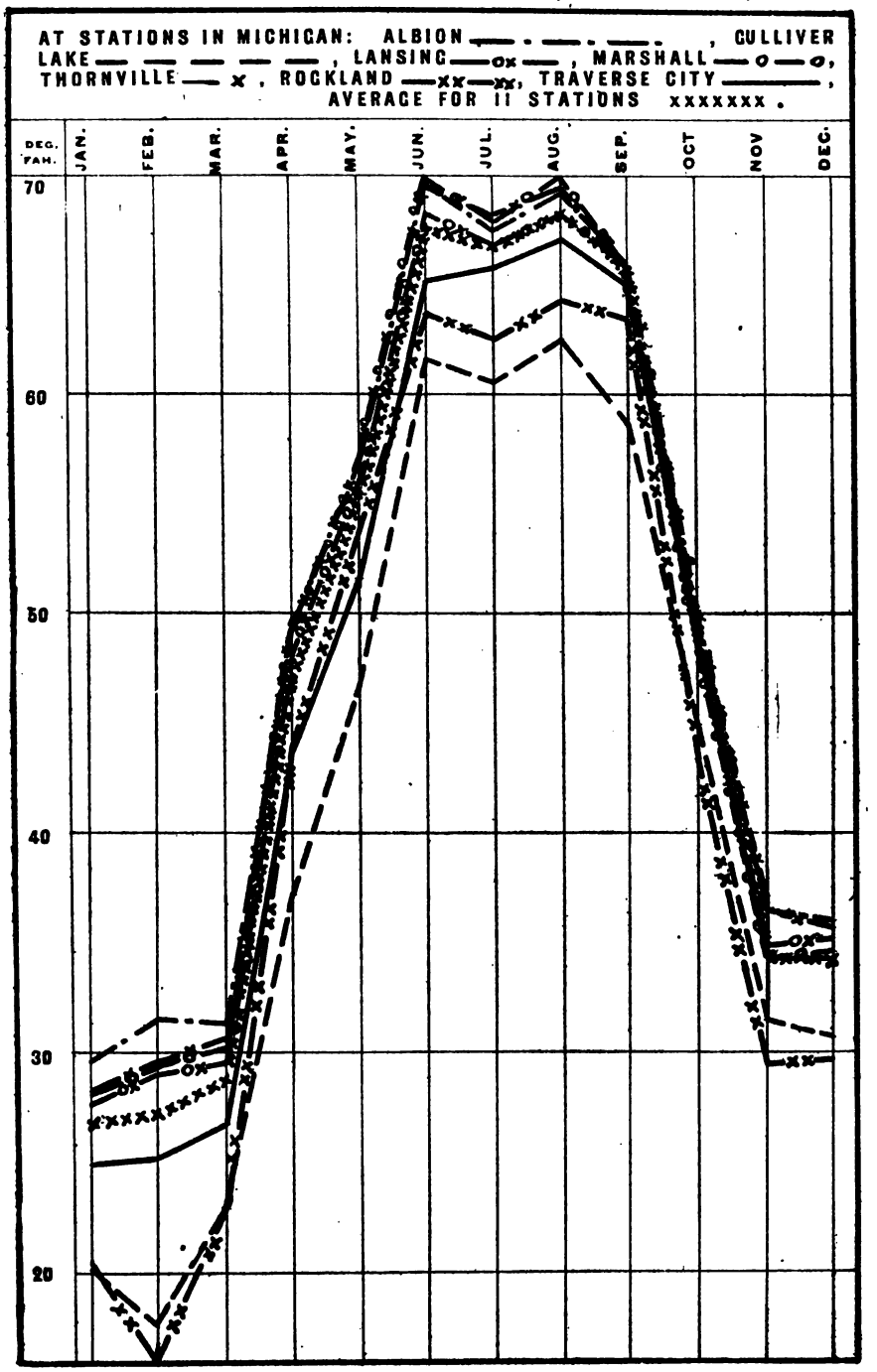
¶¶ The average for 10 months is 51.58.

‖ For 11 months, 48.71.

The average line and lines for 7 representative stations in Table I. are graphically represented in Diagram I., page 21.

The average temperatures at each of 14 stations in Michigan, and the average for 11 stations in 1891, and in each month of that year, are stated in Table I., page 20; eight of the lines in this table are represented in Diagram 1, Page 21.

DIAGRAM 1.—AVERAGE TEMPERATURE, BY MONTHS, 1891.



Compared with the average for the preceding 27 years at the Agricultural College, the mean temperature for December was high. A comparison, by months, of temperature in 1890, with the averages for corresponding months in the preceding 27 years, 1864-90, at the Agricultural College, near Lansing, is given in Exhibit 10, page 19.

The average temperature, by months, for the 12 years, 1879-90, at Lansing, and a comparison of 1891, by months, with that average, are stated in Exhibit 11, below.

EXHIBIT 11.—*Average Temperature* by Year and Months, for the 12 Years, 1879-90. Observations made at Office State Board of Health, State Capitol, Lansing, Michigan.*

Years, etc.	Average Temperature—Degrees Fahr.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 12 years, 1879-90.	47.22	22.01	24.03	30.98	46.02	58.37	67.65	72.43	68.65	61.26	50.12	37.21	27.95
1890	47.89	31.63	31.51	28.53	46.86	53.94	71.08	71.81	65.38	57.97	49.09	39.46	27.46
1891	48.27	27.74	29.13	29.59	48.12	56.01	68.27	66.84	68.20	65 87	49.39	34.80	35.23
In 1891 Higher than Av. for 12 years, 1879-90	1.05	5.73	5.10	.....	2.10	.....	0.62	.....	.....	4.61	.....	.....	7.28
In 1891 Lower than Av. for 12 years, 1879-90	.....	.....	.....	1.39	.....	2.36	....	5.59	0.45	.....	0.73	2.41	.....
In 1891 Higher than in 1890	0.38	.....	.....	1.06	1.26	2.07	.....	.....	2.82	7.90	0.30	.....	7.77
In 1891 Lower than in 1890	.....	3.89	2.38	.....	.....	.....	2.76	4.97	.....	.....	.....	4.66	.....

* Beginning with the year 1885, slight allowance should be made for Lansing in Exhibit 11, because of a change in the location of the instruments. The amount of the variation by months is shown in Exhibit A, on page 22, Report for 1886.

EXHIBIT 12.—*Average Temperature in Degrees Fah. for the Year and Months, 1891, at Office State Board of Health, State Capitol, Lansing, Michigan, computed from readings at 7 A. M., 2 P. M. and 9 P. M., daily, from registers of the Draper Self-Recording Thermometer, compared with observations made with Green's standard mercurial Thermometer at the same hours; both thermometers placed in double-latticed shelter for instruments, in southwest part of Capitol yard.*

Tri-daily readings of instruments specified.	Year.	Average Temperature, in Degrees Fahr., Year and Months, 1891.											
		Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. Temp. from tri-daily observations with Green's Standard Mercurial Thermometer	48.27	27.74	29.13	29.59	48.12	56.01	68.27	66.84	68.20	65.87	49.39	34.80	35.23
Av. Temp. computed from readings of the Draper's Self-Recording Thermometer	46.94	27.17	28.80	28.92	46.69	54.11	65.61	64.52	65.99	63.51	48.45	34.43	35.11
Lower (-) by Draper's than by Green's thermometer	-1.33	-.57	-.33	-.67	-1.43	-1.90	-2.66	-2.32	-2.21	-2.36	-.94	-.37	-.12

EXHIBIT 13.—*Average Daily Range of Temperature, by Year and Months in 1891, compared with Annual and Monthly Averages for 1890, and for the 12 years, 1879–1890. These Averages are for Groups of Several Stations in Michigan.**

Years, etc.	Average Daily Range of Temperature—Degrees Fahr.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 12 years, 1879-90.	18.09	16.09	17.66	17.71	19.41	20.38	20.39	20.76	20.11	19.86	17.02	14.36	13.28
1890 (19 stations)...	17.38	15.22	13.99	15.92	20.68	18.00	19.96	21.37	20.06	19.67	14.67	14.72	14.33
1891 (16 stations)...	18.01	12.90	15.76	14.90	19.57	23.16	21.02	21.33	19.93	21.70	18.18	13.65	14.04
In 1891 Greater than Av. for 12 years, 1879-90	.....	.....	.....	.....	.16	2.78	.63	.57	.....	1.84	1.16	.....	.76
In 1891 Less than Av. for 12 years, 1879-90	.08	3.19	1.90	2.81	.....	.....	.....	.....	.18	.....	.....	.71	.....
In 1891 Greater than in 1890	.63	.....	1.77	.....	.....	5.16	1.06	.....	.....	2.03	3.51	.....	.....
In 1891 Less than in 1890	.....	2.32	.....	1.02	1.11	.....	.....	.04	.13	.....	.....	1.07	.29

* Otisville for 1879-80, 1882; Escanaba for 1880-87; Adrian for 1880; Reed City for 1882, 1884-85; Washington for 1882-83; Winfield for 1883; Manistique, Ionia, Swartz Creek for 1884-85; Mackinaw City for 1884-87; Hilladale for 1884; Pentwater, East Saginaw, Hudson for 1886; Port Austin for 1888-89; Manistee for 1889-90; Gulliver Lake for 1887-90; Alma, Otsego, Albion for 1890; Battle Creek for 1879-80, 1888-89; Marquette for 1879-84, 1886-90; Grand Haven for 1879-88, 1890; Detroit, Lansing for 1879-90; Alpena, Port Huron, Thornville for 1880-90; Kalamazoo for 1880-83, 1886-90; Agricultural College for 1881-90; Traverse City, Marshall for 1882-90; Harrisville for 1882, 1885-90; Ann Arbor for 1882-83, 1885-90; Birmingham for 1887, 1889-90; Tecumseh for 1883-85.

EXHIBIT 14.—*Comparisons of the Average Daily Range of Temperature for the Year and for each Month of the Year 1891, with Averages for the 17 Years, 1874–90, and for the Year 1890. Observations made with Registering Thermometers by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Michigan.*

Years, etc.	Average Daily Range of Temperature—Degrees Fahr.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 17 years, 1874-90*	20.86	16.85	18.95	19.17	22.51	23.96	22.85	24.84	25.57	24.32	20.22	16.07	14.98
1890	19.73	15.64	13.90	16.74	23.87	19.84	21.80	24.32	25.40	24.73	18.14	17.07	15.29
1891	20.05	12.70	15.80	15.10	21.80	22.40	22.28	22.10	22.84	26.76	26.30	15.63	16.40
In 1891 Greater than Av. for 17 years, 1874-90	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.44	6.08	.....	1.42
In 1891 Less than Av. for 17 years, 1874-90	0.81	4.15	3.15	4.07	1.21	1.56	0.62	2.74	1.73	.....	.....	0.44	.....
In 1891 Greater than in 1890	0.32	.....	1.90	.....	.....	2.56	0.48	.....	.....	2.03	8.16	.....	1.11
In 1891 Less than in 1890	.....	2.94	.....	1.64	2.57	.....	.....	2.22	1.56	.....	.....	1.44	.....

* For the years 1874-6, 1878, 1879 (except Nov. and Dec.), and 1880, the computations were made from the report of observations published in the Reports of the State Board of Agriculture for those years. For 1877, 1881 (except Jan.), 1882-90, the computations were made from registers or copies of registers supplied by Dr. Kedzie.

TABLE II.—*Extremes of Temperature and Days of Month on which the Highest and Range for the Year 1891, at each of 15 Stations in Michigan.—As indicated by Daily 2 P. M. and 9 P. M., by Observers* for the State Board of Health, and for the U. S.*

Line Number.	Stations in Michigan.* (Those of the U. S. Signal Service in Italics.)	Year, 1891.			January.		February.		March.		April.		May.	
		Highest.	Lowest.	Range.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.
1	At 15 Stations †	100	-14	114	52	-10	55	-14	58	-8	87	10	85	25
2	Rockland ¶	----	----	----	56^{28}	-7^{16}	57^{7}	-18^{4}	64^{29}	-6^{5}	89^{25}	8^{2}	$80^{22, 27, 29}$	18^{4}
3	Gulliver Lake ‡	86	-22	108	41^{20}	-10^{16}	40^{23}	-13^{19}	$48^{28, 29}$	-22^{1}	66^{30}	2^{5}	78^{30}	22^{3}
4	*Marquette* §	94	-12	106	40^{10}	-5^{16}	50^{15}	-12^{4}	46^{30}	-6^{1}	87^{26}	13^{5}	80^{20}	26^{3}
5	*Sault Ste. Marie* §	----	----	----	----	----	----	----	----	----	----	----	----	----
6	*Manistee* §	91	2	89	41^{20}	6^{16}	54^{24}	2^{19}	56^{29}	3^{1}	75^{21}	18^{5}	$77^{9, 20}$	30^{17}
7	Traverse City ‡	99	-14	113	47^{20}	$-10^{15, 16}$	$49^{15, 24}$	-14^{28}	$50^{10, 11, 29, 30}$	$-5^{1, 18}$	83^{21}	10^{4}	$85^{19, 20}$	25^{16}
8	*Alpena* §	91	-8	99	38^{10}	-1^{16}	49^{15}	-7^{4}	48^{11}	-8^{1}	79^{30}	$16^{4, 5}$	82^{9}	26^{5}
9	Harrisville ‡	93	-12	105	40^{20}	0^{15}	48^{15}	-12^{28}	46^{11}	-3^{5}	80^{30}	$16^{3, 4}$	83^{9}	25^{4}
10	*Grand Haven* §	88	4	84	45^{1}	8^{3}	51^{24}	$4^{3, 4}$	57^{29}	4^{1}	81^{21}	20^{5}	78^{20}	30^{5}
11	*Port Huron* §	99	2	97	49^{1}	10^{13}	52^{24}	2^{4}	50^{11}	6^{1}	79^{30}	20^{5}	82^{21}	27^{5}
12	Thornville ‡	98	-1	99	52^{1}	$10^{4, 13}$	$54^{15, 24}$	2^{4}	54^{29}	-1^{1}	78^{30}	20^{5}	84^{31}	28^{5}
13	Agr'l College ‡	97	-4	101	51^{1}	$2^{7, 8}$	$54^{15, 24}$	-4^{28}	58^{29}	2^{1}	79^{21}	19^{4}	$80^{20, 31}$	26^{4}
14	Lansing ‡ a	96	-3	99	52^{1}	4^{8}	55^{15}	-3^{28}	55^{29}	1^{1}	78^{21}	18^{4}	80^{21}	26^{4}
15	Otsego ‡	----	----	----	52^{1}	$0^{6, 7}$	$55^{15, 24}$	-5^{28}	58^{29}	2^{1}	85^{21}	16^{4}	85^{31}	$27^{4, 16}$
16	Albion ‡	94	1	93	51^{1}	9^{2}	54^{24}	1^{28}	54^{29}	4^{1}	77^{21}	20^{4}	79^{31}	29^{4}
17	Ann Arbor ¶	94	0	94	48^{1}	8^{7}	$52^{15, 25}$	0^{4}	53^{29}	3^{1}	75^{22}	18^{6}	81^{31}	28^{5}
18	Battle Creek ‡	----	----	----	52^{1}	10^{3}	56^{23}	5^{4}	55^{29}	0^{1}	79^{21}	26^{4}	83^{31}	38^{5}
19	Kalamazoo §	----	----	----	57^{1}	8^{7}	$56^{24, 25}$	5^{4}	----	----	----	----	----	----
20	Marshall ‡	100	-8	103	52^{1}	6^{3}	$54^{24, 25}$	0^{4}	57^{29}	-8^{1}	85^{21}	17^{5}	85^{19}	28^{5}
21	Tecumseh ‡	----	----	----	50^{2}	5^{8}	56^{16}	-2^{4}	59^{30}	$1^{1, 15}$	79^{23}	19^{5}	$82^{10, 20}$	$28^{5, 17}$
22	Birmingham ‡	96	0	96	52^{25}	9^{12}	54^{24}	2^{3}	$53^{11, 29}$	5^{14}	80^{30}	20^{4}	84^{31}	27^{4}
23	*Detroit* §	96	2	94	50^{1}	14^{13}	$53^{15, 24}$	2^{4}	52^{11}	6^{1}	79^{30}	21^{5}	81^{21}	29^{5}

NOTE.—The small figures above and at the right of numbers denoting the degrees of temperature, state the day or days of the month on which the highest or the lowest temperature occurred.

* The names of observers, etc., are stated in Exhibit 1, page 3.

† The line No. 1, and the three columns for the year 1891, relate only to the 15 stations from which observations were received for every month of the year. It does not include Rockland, Sault Ste. Marie, Otsego, Kalamazoo, Tecumseh and Battle Creek. The line for Gulliver Lake is not included in line No. 1. The registers were received too late.

‡ For stations marked thus ‡, the daily readings of registering thermometers were recorded at 7 A. M. for the preceding calendar day.

§ At the stations of the U. S. Signal Service and at Kalamazoo, the maximum thermometer was read and recorded at 8:00 A. M., and the minimum at 8:00 P. M., 75th meridian time. The local time at these stations corresponding to 8:00 A. M. and 8:00 P. M., 75th meridian time, is as follows: at Port Huron, 7:30 A. M. and 7:30 P. M.; at Detroit, 7:28 A. M. and 7:28 P. M.; at Alpena, 7:26 A. M. and 7:26 P. M.; at Grand Haven, 7:15 A. M. and 7:15 P. M.; at Marquette, 7:11 A. M. and 7:11 P. M.; at Manistee, 7:15 A. M. and 7:15 P. M.

¶ At Ann Arbor and Rockland the registering thermometers were read and recorded at 9 P. M.

a Beginning with the year 1885 allowance must be made for Lansing in Table II, because of a change in the location of the instruments. The amount of the variation by months is shown in Exhibit B, on page 22, Report for 1886.

the Lowest Temperature occurred by Months of the year 1891; also, Extremes and Readings of Registering Thermometers, or by Observations made daily at 7 A. M., Signal Service.

June.		July.		August.		September.		October.		November.		December.		Line Number.
Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	
97	31	95	37	100	37	93	35	87	21	65	-3	60	8	1
94[14]	28[3, 4]	88[12]	39[19]	93[8]	36[17, 22, 23]	92[21]	36[30]		24[10]					2
84[19]	33[5]	79[12]	37[20]	86[9]	39[24]	77[18]	35[30]	70[2]	23[11]	50[5, 7]	4[27]	59[1]	5[17, 18]	3
94[14]	31[5]	84[13]	35[20]	86[8]	45[3-24-25-28]	91[17, 24]	43[4, 30]	75[2]	30[20]	52[7]	2[27]	55[12]	8[30]	4
87[14]	34[5]	83[13]	40[19-20-28]	89[7]	39[29]	87[24]	36[9, 30]	77[2]	24[28]	47[8]	-2[29]	48[4]	4[17]	5
85[14, 15]	41[4, 5]	84[22]	44[25, 31]	91[8]	50[18, 24, 29]	89[24]	40[30]	83[2]	30[23]	53[8]	16[29]	54[3]	16[26, 27]	6
97[14]	34[4]	95[12]	41[30]	99[8]	42[28]	92[24]	35[29]	87[2]	27[11]	54[8]	12[25]	58[3, 22]	11[27]	7
89[15, 25]	34[5]	91[13]	40[31]	85[20]	41[29]	91[17, 24]	37[30]	87[2]	25[28]	52[11, 16]	14[18, 28, 29]	53[12, 22]	11[17]	8
93[25]	34[4]	91[13]	37[30]	85[20]	37[28]	89[17, 28]	35[29]	82[3]	22[22]	52[8]	10[17]	52[13]	12[16, 17]	9
84[14]	40[5]	84[21]	44[31]	88[8]	47[29]	85[19]	41[30]	81[2]	28[28]	58[8]	16[17, 29]	58[3]	17[18]	10
89[15, 25]	45[4, 5]	87[22]	44[31]	99[9]	46[29]	90[25]	43[8, 9]	84[2]	25[23]	65[9]	9[30]	56[3, 15]	16[8]	11
92[15]	42[5]	90[22]	45[31]	98[9]	44[29]	89[18, 25]	43[30]	84[2]	28[28]	60[8, 9, 10]	9[29]	60[15]	15[17, 18]	12
88[14, 16]	37[4]	86[13]	42[26]	97[9]	40[28]	90[23, 24]	38[8]	84[2]	21[27]	58[10, 15]	0[28]	55[14, 15]	12[7]	13
89[14]	37[4]	87[13]	43[26, 27]	96[9]	42[25, 28]	90[24]	38[3]	84[2]	26[22]	58[10]	4[28]	57[15]	11[16]	14
95[14]	39[4]	91[21]	40[26]	99[9]	43[28]	93[24]	38[7, 8]	89[2]	28[27]					15
90[16]	40[4]	86[13]	44[26]	94[9]	44[28]	86[24]	41[8]	79[2]	29[22]	58[10]	2[28]	56[15]	13[18]	16
90[15, 25]	43[5]	87[22, 23]	47[8]	94[9]	46[29]	88[25]	44[9]	80[2]	26[28]	59[9]	7[29]	58[22]	13[7, 8]	17
92[14]	45[4]	92[13]	54[7]	99[9]	50[27]	92[17, 18]	43[30]	83[2]	33[12, 28]	60[7, 8, 9]	8[29]	56[4, 16]	16[7]	18
						90[24]	43[30]	85[2]	31[28]	60[10]	10[30]	57[14, 15]	12[7]	19
93[25]	38[5]	91[21]	42[27]	100[9]	41[29]	91[24]	39[8, 9]	85[2]	28[28]	56[10]	-3[29]	56[15]	13[27]	20
92[16]	40[5]	92[23]	43[27]	99[10]	40[29]		40[8]			64[1]	-4[30]	59[16]	13[5]	21
95[25]	40[4]	90[12]	43[30]	96[8]	43[28]	17, 25 88	38[5]	81[2]	25[27]	62[9]	0[29]	57[15]	10[7]	22
88[15]	42[5]	89[13]	49[8]	96[9]	48[29, 31]	93[25]	47[8]	85[2]	28[28]	64[9]	10[29]	58[15]	17[18]	23

The average daily range of temperature at from 6 to 19 stations per year, by months, for a period of 12 years, 1879–90, and a comparison of 1891, with the monthly averages for that period and for 1890, are given in Exhibit 13, page 23. The highest and lowest temperatures in every month in 1891, at each of 15 stations, are stated in Table II., pages 24 and 25. The average daily range of temperature by months in 1891, at each of 22 stations, and the average for 16 of the stations, are stated in Table III., page 26. The lines for 10 of these stations, and the average line for the 16 stations, are represented in Diagram II., page 27. It will be noticed that the greatest average daily range occurred during the months of May and September.

TABLE III.—*Average Daily Range of Temperature, by Registering Thermometers during the Year and during each Month of the Year 1891, at each of 17 stations in Michigan, and Average for 16 Stations.*

Stations in Michigan.* (Those of the U. S. Signal Service in Italics.)	Divisions of the State.†	Norm. ‡	Average Daily Range of Temperature.—Degrees Fahr.												
			Yr. 1891.	Months, 1891.											
				Jan.	Feb.	Mar.	Apr.	May.	Jun.	July.	Aug	Sept.	Oct.	Nov.	Dec.
Av. for 16 Stations §	.....	.....	18.01	12.90	15.76	14.90	19.57	23.16	21.02	21.33	19.93	21.70	18.18	13.65	14.04
Rockland	U. P.	.....	26.60	20.77	23.97	28.25	31.64	34.28 b	34.14	28.13 a	29.68 c	29.60	21.00 e	17.29 f	20.50 d
Gulliver Lake	U. P.	20.05 5	20.06	21.42	21.93	23.58	18.96	24.65	24.73	22.45	21.22	18.97	17.29	11.83	13.68
Marquette	U. P.	15.68 6	15.23	11.90	14.50	15.30	15.90	21.20	18.40	16.50	14.60	17.10	13.70	10.80	12.90
Sault Ste. Marie	U. P.	.....	‖	.....	.....	.....	.....	.....	23.40	20.30	20.30	19.80	14.90	8.70	10.50
Manistee	N. W.	12.71 3	13.00	10.50	11.40	11.90	13.00	16.40	16.20	14.30	13.60	17.00	13.60	8.20	9.90
Traverse City	N. W.	19.71 10	20.78	21.54	21.50	20.00	21.96	25.80	22.66	23.97	20.81	23.26	19.52	13.60	14.77
Alpena	N. E.	15.72 12	15.05	9.60	14.40	10.70	16.40	19.30	16.20	19.90	16.30	18.10	15.80	10.70	13.20
Harrisville	N. E.	20.58 7	17.92	14.16	19.64	13.65	20.74	24.35	19.24	20.87	17.39	20.40	16.96	13.24	14.42
Grand Haven	W.	14.43 2	14.50	11.30	13.00	12.90	14.90	17.70	16.20	15.80	16.20	18.60	16.10	10.50	10.80
Port Huron	B. & E.	15.82 12	15.32	9.20	12.10	10.90	17.00	20.10	15.60	18.20	17.60	19.50	16.80	11.60	13.20
Thornville	B. & E.	16.43 12	16.19	10.97	11.54	12.28	16.90	23.65	20.37	21.81	19.32	19.80	16.61	10.03	11.00
Agr'l College	C.	20.18 10	20.05	12.70	15.80	15.10	21.30	22.40	22.23	22.10	23.84	26.76	26.30	15.63	16.40
Lansing (S. B. of H.)	C.	19.55 13	20.39	14.04	17.03	15.45	21.34	24.58	22.23	25.10	24.03	25.87	22.26	16.04	16.75
Otsego	S. W.	.....	¶	14.23	17.00	16.42	23.07	27.80	25.24	27.93	27.20	29.76	24.00	.....	.....
Albion	S. C.	16.96 2	17.65	12.10	15.48	14.10	18.60	21.40	19.30	22.50	19.30	21.10	18.20	14.80 c	14.90
Ann Arbor	S. C.	17.99 10	17.77	11.70	15.51	14.86	20.20	22.60	21.50	22.10	19.30	20.70	17.00	14.20	13.60
Battle Creek	S. C.	.....	**	.....	.....	12.64	.....	21.35	18.56	18.03	17.19	20.70	19.62	.....	.....
Kalamazoo	S. C.	.....	††	10.87	15.38	.....	.....	.....	.....	.....	.....	19.93	17.04	13.38	13.34
Marshall	S. C.	19.91 10	21.36	12.61	16.36	15.84	22.57	29.19	26.97	27.84	27.16	26.90	21.93	14.00	14.90
Tecumseh	S. C.	.....	‡‡	14.26	16.03	18.32	23.47	28.52	25.10	27.84	25.26	25.00 g	.....	15.50	18.00 b
Birmingham	S. E.	22.05 5	21.09	13.97	17.40	14.84	22.83	27.03	24.10	23.61	22.46	23.87	19.67	26.90	16.34
Detroit	S. E.	15.70 13	15.29	9.30	12.60	12.30	17.90	20.60	18.00	18.50	17.30	18.60	15.50	10.80	12.10

* The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit I, page 3.

† For counties in each division see Exhibit I, in a paper which follows on weekly reports of sickness.

‡ Numbers in this column state the annual average range of temperature for periods of years ending in each case with December 31, 1891. The small figures above and at the right of numbers which state the range of temperature, denote the number of years included in the average.

§ This line is an average for all stations for which statements nearly complete are given for every month of the year. It does not include the lines for Sault Ste. Marie, Otsego, Battle Creek, Kalamazoo and Tecumseh. The line for Gulliver Lake is not included in "Av. for 16 Stations." The registers were received too late.

‖ The average for 7 months is 16.84. ¶ For 10 months, 23.27. ** For 7 months, 18.30. †† For 6 months, 14.99. ‡‡ For 11 months, 21.57.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

a For 30 days. b For 29 days. c For 28 days. d For 26 days. e For 21 days. f For 17 days. g For 15 days.

NOTE.—Graphic representations of statements in Table III., are given in Diagram II, page 27.

DIAGRAM II.- AV. DAILY RANGE OF TEMP., BY MONTHS, 1891.

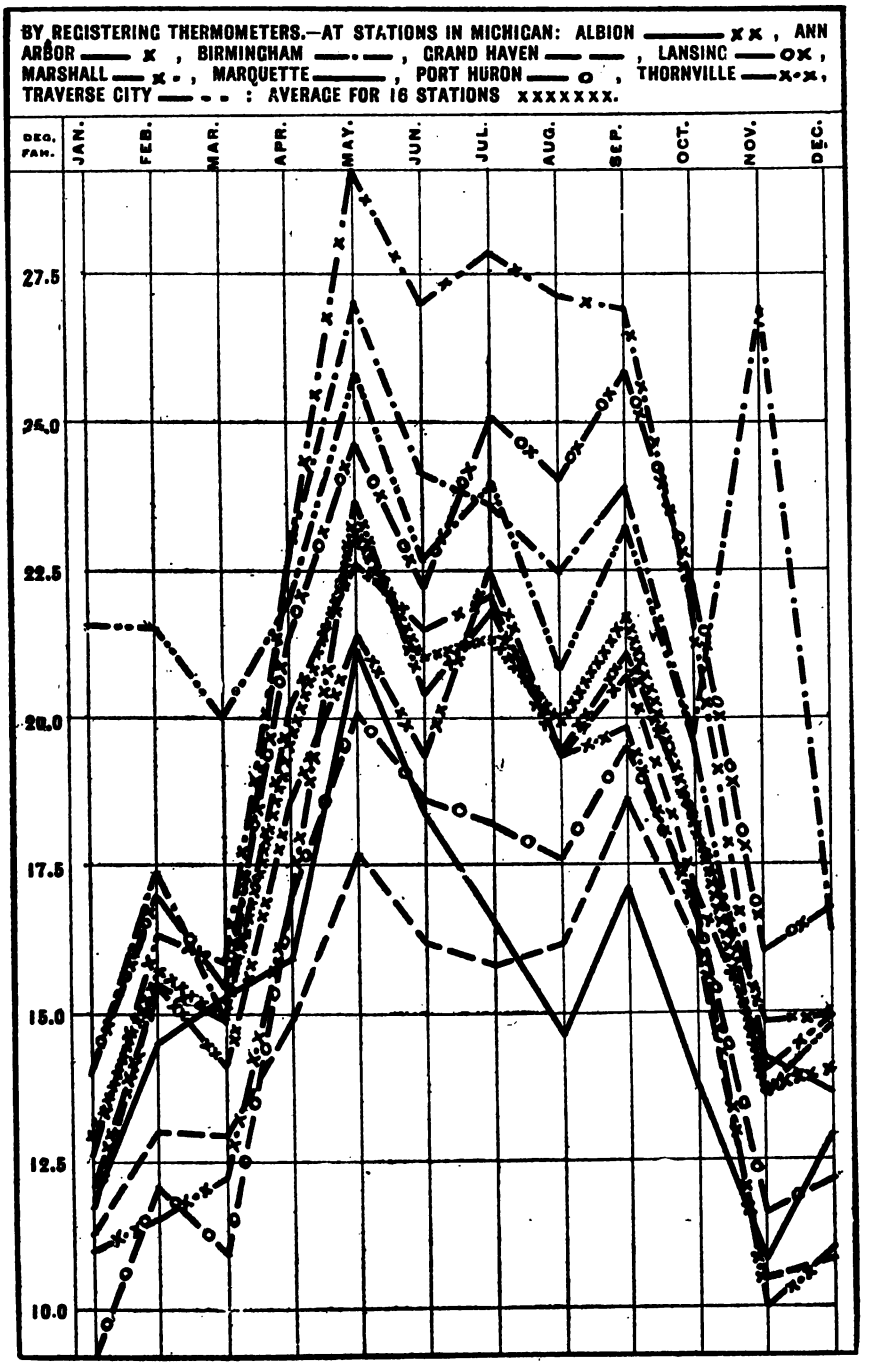


EXHIBIT 15.—*Comparisons of the Extremes and the Range of Temperature (Degrees Fahr.) during the Year, and during each Month of the Year 1891, with the Average of the Extremes, and of the Range, for the Fourteen Years, 1877–90; also, Statement of the Extremes and of the Range for each of the Six Years, 1885–90. Observations made with Registering Thermometers by Observers for the State Board of Health, and for the U. S. Signal Service. These Comparisons, etc., are for* **Groups of Several Stations in Michigan.**

Year and Months..	Extremes and Ranges of Temperature.—Degrees F.																										
	1885.			1886.			1887.			1888.			1889.			1890.			Av. for 14 years, 1877–90.			1891.*			1891 Higher (+), or Lower (-), than Av. 14 years, 1877–90.		
	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.
Year	96	-36	132	101	-30	131	104	-28	132	99	-33	132	97	-23	120	100	-26	126	99	-27	126	100	-14	114	+1	+13	-12
Av. Month	75	7	69	79	4	75	79	10	69	76	9	67	77	14	63	79	10	68	79	10	69	78	14	64	-1	+4	-5
January	53	-36	89	55	-22	77	54	-28	82	45	-23	68	53	-7	60	66	-14	80	54	-21	75	52	-10	62	-2	+10	-13
February	50	-33	83	54	-30	84	55	-21	76	49	-33	82	49	-23	72	63	-8	71	57	-20	77	55	-14	69	-2	+6	-8
March	55	-29	84	73	-25	98	60	-14	74	69	-20	89	65	5	60	59	-26	85	65	-15	80	58	-8	66	-7	+7	-14
April	84	6	78	84	0	84	82	8	74	88	6	82	80	14	66	80	1	79	83	8	75	87	10	77	+4	+2	+2
May	87	18	69	88	22	66	97	28	69	84	21	63	95	23	72	91	21	70	89	22	67	85	25	60	-4	+3	-7
June	93	32	61	95	27	68	98	40	58	99	29	70	93	36	57	98	32	66	95	32	63	97	31	66	+2	-1	+3
July	96	39	57	101	33	68	104	39	65	97	40	57	97	36	61	98	39	59	98	40	58	95	37	58	-3	-3	0
August	90	35	55	98	32	66	98	37	61	94	33	61	94	37	57	100	34	66	96	37	59	100	37	63	+4	0	+4
September	88	25	63	91	27	64	91	26	65	90	28	62	93	25	68	90	27	63	94	28	66	93	35	58	-1	+7	-8
October	81	13	68	83	16	67	80	11	69	73	23	50	76	14	62	80	24	56	84	19	65	87	21	66	+3	+2	+1
November	68	19	49	72	-15	87	70	-6	76	72	8	64	66	11	55	68	0	68	70	1	69	65	-3	68	-5	+4	-1
December	55	-11	66	53	-22	75	56	-6	62	55	1	54	65	2	63	50	-6	56	57	-9	66	60	8	52	+3	+17	-14

* For the 15 years, 1877–91, the highest temperature was 105°, at Battle Creek, September 9, 1884; the lowest was -36°, at Manistique, January 27, 1885.

The average annual and monthly temperature at from 11 to 22 stations for a period of 14 years, 1877–90, is stated in Exhibit 9, page 19, in which is also given, by months, a comparison of 1891 with the average for 1890, and with the averages for the 14 years, 1877–90. By Exhibit 9, page 19, which gives averages for groups of several stations in Michigan, it appears that in 1891 the mean temperature in March, May, July, October and November was lower than in those months in 1890. It also appears that January, February, April, June, August, September and December were warmer than the average temperature of the corresponding months for the 14 years, 1877–90.

EXHIBIT 16.—*Comparisons of the Extremes and the Range of Temperature (Degrees Fahr.) during the Year, and during each month of the Year 1891, with the Average of the Extremes and of the Range, for the 18 years, 1873–90: also Statement of the Extremes and of the Range for each of the six Years, 1884–89. Observations made with Registering Thermometers (except for the first two months of 1873, and for those two months with an ordinary Thermometer, at 7 A. M., 2 P. M. and 9 P. M.) Daily by Prof. R. C. Kedzie,* **at the State Agricultural College, near Lansing, Mich.**

Year and Months.	Extremes and Ranges of Temperature.—Degrees F.																										
	1885.			1886.			1887.			1888.			1889.			1890.			Av. 18 years, 1873-90.			1891.*			1891 Higher (+), or lower (-), than Av. 18 years, 1873-90.		
	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.
Year	90	-24	114	93	-18	111	98	-26	124	92	-19	114	93	-15	108	97	-4	101	94	-18	112	97	-4	101	+3	+14	-11
Av. Month.	68	15	53	74	17	57	73	17	57	72	18	54	73	20	53	74	21	53	73	17	56	73	19	54	0	+2	-2
January	42	-22	64	50	-12	62	46	-26	72	36	-16	52	50	2	48	63	3	60	48	-11	59	51	2	49	+3	+13	-10
February	45	24	69	52	-18	70	52	0	52	45	-19	64	42	-15	57	61	12	49	51	-9	60	54	-4	58	+3	+5	-2
March	44	-13	57	65	5	60	53	-1	54	69	2	67	65	8	57	52	-4	56	60	0	60	58	2	56	-2	+2	-4
April	81	17	64	80	16	64	76	14	62	81	21	60	75	20	55	76	20	56	78	16	62	79	19	60	+1	+3	-2
May	85	26	59	88	34	49	88	38	50	80	25	55	83	29	59	83	28	55	85	29	56	80	26	54	-5	-3	-2
June	86	40	46	90	41	49	91	43	48	92	39	53	85	39	46	92	39	53	90	40	50	88	37	51	-2	-3	-1
July	90	47	43	93	45	48	98	44	54	90	47	43	89	47	42	92	44	48	93	46	47	86	42	44	-7	-4	-3
August	84	42	42	91	37	54	98	37	61	90	36	54	93	42	51	97	34	63	93	39	54	97	40	57	+4	+1	+3
September	80	35	45	87	35	52	88	26	62	88	32	56	92	25	67	90	29	61	88	31	57	90	38	52	+2	+7	-5
October	72	17	55	80	30	50	73	12	61	73	26	47	73	17	56	76	25	51	78	21	57	84	21	63	+6	0	+6
November	62	21	41	70	3	67	65	13	52	72	13	59	58	11	47	62	20	42	63	9	54	58	0	58	-5	-9	+4
December	48	-7	55	50	-13	63	56	-3	59	52	9	43	62	14	48	47	7	40	52	-2	54	55	12	43	+3	+14	-11

* For the 19 years, 1873-91, the highest temperature was 101°, August 11, 1874; the lowest was -33°, February 8, 1875, and the range was 134° F.

By Exhibit 16, page 29, it appears that, at the Agricultural College, the lowest temperature reached in March, 1891, was above the average lowest temperature for the corresponding month in the preceding 18 years, and that in the month of December, 1891, the range of temperature was considerably less than the average range of temperature for the corresponding month in the 18 preceding years, and also the highest temperature for 1891 was above the average highest temperature for the preceding 18 years, and the lowest temperature was above the average lowest temperature for those years. The highest and lowest temperatures at the Agricultural College, in every month of the 7 years, 1885–91, and comparisons of months in 1891, with the average highest and lowest temperatures by months for the preceding 18 years, are stated in Exhibit 16.

EXHIBIT 17.—*Average Absolute Humidity, by Year and Months, in 1891, compared with Annual and Monthly Averages for 1890, and for the 14 years, 1877–90.* These Averages are for Groups of several Stations in Michigan.*

Years, etc.	Absolute Humidity—Grains of Vapor in a Cubic Foot of Air.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 14 years, 1877-90†	3.42	1.43	1.53	1.79	2.75	3.92	5.39	6.08	5.73	4.85	3.54	2.33	1.79
1890 (10 stations)	3.52	2.02	1.95	1.73	2.93	3.72	6.23	5.95	5.46	4.59	3.66	2.46	1.60
1891 (8 stations)	3.54	1.77	1.84	1.79	3.19	3.67	5.86	5.30	5.83	5.42	3.37	2.32	2.14
In 1891 Greater than Av. for 14 years, 1877-90	.12	34	.31	0	.44	....	.47	.....	.10	.57	.....	.....	.35
In 1891 Less than Av. for 14 years, 1877-90	.....	.....	.....	.....	....	.25	....	.78	.....	.....	.17	.01	.....
In 1891 Greater than in 1890	.02	.....	.....	.06	.26	.....	.....	.....	.37	.83	.....	.....	.54
In 1891 Less than in 1890	.....	.25	.11	.....	.....	.05	.37	.65	.....	.....	.29	.14	.....

* Beginning with the year 1885, allowance must be made for Lansing in Exhibit 18, because of a change in the location of the instruments. The amount of variation by months is shown in Exhibit C, on page 23, Report for 1886.

† Kalamazoo for 1877-83, 1836-89; Mendon for 1877-82; Otisville for 1878-80, 1882; Niles for 1878-79, 1881; Nirvana for 1878-79 and first four months of 1880; Reed City for last eight months of 1880 and 1881-85; Benton Harbor, Coldwater for 1877-78; Washington for 1880-83; Petoskey for 1879; Winfield for 1881, 1883; Woodmere Cemetery for 1877-79; Hastings, Parkville for 1882; Hillsdale for 1882-84; Manistique for 1884-85; Mackinaw City for 1884-87; Ionia for 1884; Swartz Creek for 1884-85; Pentwater for 1886; Marquette for 1879-84, 1886-87; Escanaba for 1880-87; Alpena, Grand Haven, Port Huron for 1879-87; Detroit for 1877-87; Alma for 1890; Tecumseh for 1878-85; Harrisville for 1882, 1885-86; Battle Creek for 1877-79, 1882, 1885; Thornville for 1877-90; Lansing for 1879-90; Agricultural College for 1877, 1881-90; Ann Arbor for 1881-90; Traverse City, Marshall for 1882-90; Gulliver Lake for 1887-90; Birmingham for 1887-90; Albion for 1890.

EXHIBIT 18.—*Comparison of the Average Absolute Humidity for the Year, and for each Month of the Year 1891, with Averages for the 25 Years, 1866-90, and for the Year 1890. Observations made at 7 A. M., 2 P. M. and 9 P. M., daily, by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Mich.*

Years, etc.	Absolute Humidity—Grains of Vapor in a Cubic Foot of Air.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 25 years, 1866-90	3.47	1.46	1.55	1.84	2.70	4.03	5.63	6.39	5.90	4.80	3.33	2.22	1.69
1890	3.45	2.12	2.01	1.69	2.99	3.70	6.10	5.67	5.19	4.40	3.54	2.44	1.56
1891	3.43	1.81	1.83	1.79	3.12	3.56	5.67	5.09	5.53	5.15	3.28	2.24	2.12
In 1891 Greater than Av. for 25 years, 1866-90	.....	0.35	0.28	.....	0.42	.....	0.04	.....	.....	0.35	.....	0.02	0.43
In 1891 Less than Av. for 25 years, 1866-90	0.04	.....	.....	0.05	.....	0.47	.....	1.30	0.37	.....	0.05	.....	.....
In 1891 Greater than in 1890	.....	.....	.....	0.10	0.13	.....	.....	.....	0.34	0.75	.....	.....	0.56
In 1891 Less than in 1890	0.02	0.31	0.18	.....	.....	0.14	0.43	0.58	.....	.....	0.26	0.20	.....

EXHIBIT 19.—*Average Relative Humidity, by Year and Months, in 1891,* compared with Annual and Monthly Averages for 1890, and for the 13 years, 1878-90. These Averages are for Groups of Several Stations in Michigan.*

Years, etc.	Per Cent of Saturation.—Relative Humidity.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 13 yrs., 1878-90 †.	76	82	82	78	70	69	73	72	73	75	76	79	88
1890 (10 stations)...	79	87	86	82	73	74	74	69	76	80	88	80	83
1891 (8 stations)....	77	87	84	88	74	66	78	70	78	75	75	84	80
In 1891 Greater than Av. for 13 years, 1878-90.....	1	5	2	5	4	.....	0	.....	0	0	.....	5	.....
In 1891 Less than Av. for 13 years, 1878-90.....	.....	.....	.....	.....	.....	3	.....	2	.....	.....	1	.....	8
In 1891 Greater than in 1890	.....	0	.....	1	1	.....	.....	1	.....	.....	.....	4	.....
In 1891 Less than in 1890.....	2	.....	2	.....	.....	8	1	.....	3	5	8	.....	8

* Beginning with the year 1885, allowance must be made for Lansing in Exhibit 20, because of a change in the location of instruments. The amount of the variation is shown in Exhibit D, on page 23, Report for 1886.

† Mackinaw City for 1884-87; Kalamazoo for 1878-83, 1886-89; Mendon for 1878-82; Otisville for 1878-80, 1882; Nirvana for 1878-79 and first four months of 1880; Reed City for last eight months of 1880 and 1881-85; Niles for 1878-79, 1881; Woodmere Cemetery for 1878-79; Washington for 1880-83; Coldwater for 1878; Petoskey for 1879; Mallory Lake for first seven months of 1881, Hudson for last five months of 1881; Hillsdale for 1882-84; Hastings for 1882; Winfield for 1883; Manistee, Swartz Creek for 1884-85; Ionia for 1884; Pentwater for 1886; Marquette for 1879-84, 1886-87; Escanaba for 1880-87; Alpena, Grand Haven, Port Huron for 1879-87; Detroit for 1878-87; Gulliver Lake for 1887-90; Battle Creek for 1878-79, 1882, 1885; Alma for 1890; Tecumseh for 1878-85; Albion for 1890; Thornville for 1878-90; Ann Arbor for 1881-1890; Lansing for 1879-90; Agricultural College for 1881-1890; Marshall for 1882-90; Traverse City for 1882-90; Harrisville for 1882, 1885-86.

EXHIBIT 20.—*Comparison of the Average Relative Humidity of the Air (Per Cent of Saturation) for the Year, and for each Month of the Year 1891, with Averages for the 27 Years 1864-90, and for 1890. Observations made at 7 A. M., 2 P. M. and 9 P. M. Daily, by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Michigan.*

Years, etc.	Per Cent of Saturation.—Relative Humidity.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 27 years, 1864-90.	79	87	86	83	70	69	76	73	76	79	79	82	86
1890.....	76	87	84	79	68	70	73	65	71	76	80	77	81
1891.....	75	90	81	80	70	61	78	70	67	72	71	81	78
In 1891 Greater than Av. for 27 years, 1864-90	.....	3	.....	.....	0	.....	.....	.....	.....	.....	.....	.....	.....
In 1891 Less than Av. for 27 years, 1864-90.....	4	.....	5	3	0	8	3	3	9	7	8	1	8
In 1891 Greater than in 1890	.....	3	.....	1	2	.....	0	5	.....	.....	.....	4	.....
In 1891 Less than 1890.....	1	.....	3	.....	.....	9	0	.....	4	4	9	.....	8

TABLE IV.—ABSOLUTE HUMIDITY.—*The Average Number of Grains of Vapor of Water in a Cubic Foot of Air for Months and Year 1891, at 9 Stations in Michigan; also Average Line for 8 Stations.—Average of Observations made Daily at 7 A. M., 2 P. M., and 9 P. M., by Observers* for the State Board of Health.*

Stations in Michigan.*	Divisions of the State.†	Grains of Vapor in a Cubic Foot of Air—(Absolute Humidity.)§												
		Year.		Months, 1891.										
		Norm. ‡	1891.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 8 stations¶	.....	.....	3.54	1.77	1.84	1.79	3.19	3.67	5.86	5.30	5.83	5.42	3.37	2.32	2.14
Rockland	U. P.	.....	**	1.20	1.28	1.61	d 2.61	g 2.98	c 4.56	d 4.51	f 4.82	f 4.54	k 2.66	.....	i 2.15
Gulliver Lake	U. P.	3.02[5]	3.09	1.49	1.38	1.65	2.46	2.92	4.65	4.71	5.23	4.99	3.21	2.28	2.07
Traverse City	N. W.	3.36[10]	3.41	1.73	1.76	1.81	3.86	3.20	5.30	5.10	5.88	5.45	3.37	2.31	2.23
Harrisville	N. E.	2.69[4]	2.77	0.97	0.97	1.11	2.24	3.02	4.59	5.11	4.87	4.57	2.69	1.64	1.46
Thornville	B. & E.	3.69[15]	3.60	1.97	1.94	1.98	3.19	3.76	5.70	5.26	5.67	5.42	3.55	2.50	2.20
Agr'l College	C.	3.48[12]	3.43	1.81	1.83	1.79	3.12	3.56	5.67	5.09	5.53	5.15	3.28	2.24	2.12
Lansing (S. B. of H.)¶¶	C.	3.38[13]	3.36	1.64	1.72	1.71	3.09	3.45	5.57	5.05	5.39	5.23	3.21	2.16	2.04
Otsego	S. W.	.....	††	1.89	1.97	1.97	3.33	3.95	6.35	5.50	5.72	c 5.42	3.56	.....	.....
Albion	S. C.	3.59[2]	3.65	1.64	1.69	1.47	3.32	3.97	6.43	5.52	6.10	5.74	3.53	2.27	2.15
Ann Arbor	S. C.	3.48[11]	3.44	j 1.74	h 1.82	1.77	3.06	a 3.57	5.96	5.27	5.80	5.19	a 3.07	2.14	e 1.94
Battle Creek	S. C.	.....	‡‡	.....	2.06	2.10	3.63	4.28	6.52	6.07	6.26	c 5.99	3.66	2.36	2.19
Marshall	S. C.	3.71[10]	3.70	1.83	h 1.98	1.97	c 3.43	d 3.87	d 6.06	5.45	b 6.27	d 5.45	3.37	2.43	b 2.29
Birmingham	S. E.	3.55[5]	3.72	1.77	1.95	1.82	3.41	3.96	6.18	5.68	6.01	5.70	3.57	2.49	b 2.11

* The names of observers, their places of observation, and the counties in which these places are situated are stated in Exhibit I, page 3.

† The full names of the divisions and the counties in each division are stated in Exhibit I., in a paper which follows, on weekly reports of sickness.

‡ Numbers in this column state the average annual Absolute Humidity for periods of years ending in each case with Dec. 31, 1891. The small figures above and at the right of numbers which state the Absolute Humidity, denote the number of years included in the average.

§ The number of grains of vapor in a cubic foot of air at each observation was determined from readings of the psychrometer by means of Glaisher's table, Table XII., of the Smithsonian Meteorological and Physical Tables (1859).

¶ This line is an average for only the stations at which observations were made tri-daily, and from which statements, nearly complete, were received for every month of the year. It does not include the lines for Harrisville, Otsego, Rockland and Battle Creek. The line for Gulliver Lake is not included in "Av. for 8 Stations." The registers were received too late.

** The average for 11 months in 1891 is 2.99. †† For 10 months, 3.97. ‡‡ For 11 months, 4.10.

¶¶ Beginning with the year 1885, allowance must be made for Lansing in Table IV., because of a change in the location of the instruments. The amount of the variation by months is shown in Exhibit C, page 23, Report for 1886.

NOTE.—The computations of Absolute Humidity at Ann Arbor and Albion for each month in 1891 were furnished by the observer there. All other computations in Table IV. were made at the office of the Secretary of the State Board of Health.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

a For 92 observations. b For 91 observations. c For 89 observations. d For 88 observations.
e For 87 observations. f For 86 observations. g For 84 observations. h For 83 observations.
i For 78 observations. j For 63 observations. k For 61 observations.

The "average" line, and the lines for seven stations in Table IV. are graphically represented in Diagram III, page 33.

DIAGRAM III.- ABSOLUTE HUMIDITY, BY MONTHS, 1891.

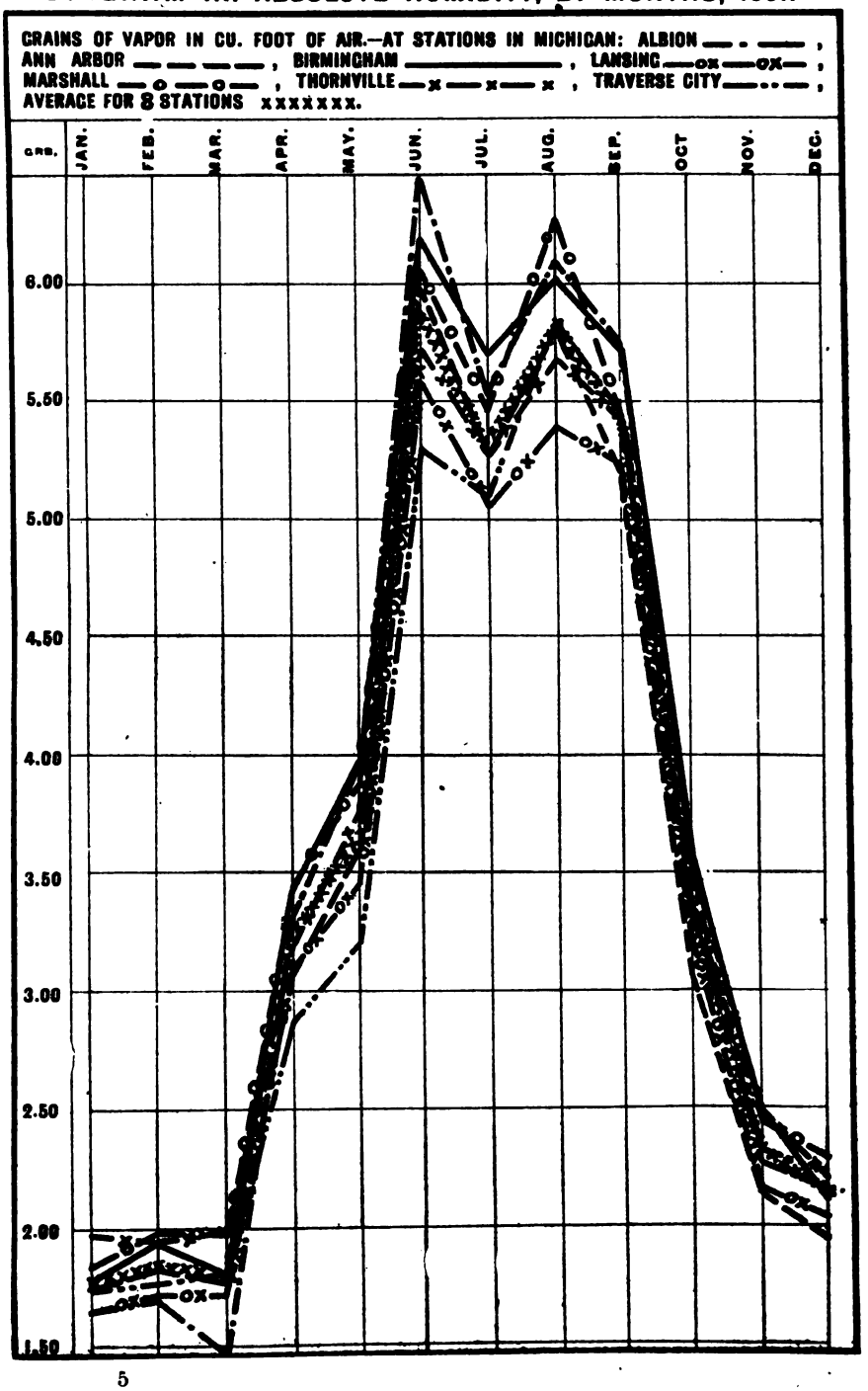


TABLE V.—RELATIVE HUMIDITY.—*Average Per Cent of Saturation of the Atmosphere with Vapor of Water during the Year, and during each Month of the Year 1891, at 10 Stations in Michigan; also Average line for 8 Stations. Average of Observations made Daily at 7 A. M., 2 P. M. and 9 P. M., by Observers* for the State Board of Health.*

Stations in Michigan.*	Divisions of the State.†	Per Cent of Saturation.—Relative Humidity.												
		Year.		Months, 1891.										
		Norm. ‡	1891.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 8 Stations§	.....	.....	77	87	84	83	74	66	73	70	73	75	75	84	80
Rockland	U. P.	 5	¶	79	91	90	70 d	52 f	63 c	66 d	67 e	66 e	73 j	.....	91 h
Gulliver Lake	U. P.	83 10	84	93	92	91	84	68	70	74	79	85	84	93	90
Traverse City	N. W.	82	79	92	91	89	76	66	72	68	77	76	75	86	84
Harrisville	N. E.	 14	63	61	55	60	61	63	72	76	70	65	57	60	55
Thornville	B. & E.	79 28	76	92	86	87	71	62	68	66	70	74	76	85	78
Agr'l College	C.	79 13	75	90	81	80	70	61	73	70	67	72	71	81	78
Lansing, S. B. of H. ¶¶	C.	72	71	80	77	77	69	57	69	65	69	72 c	69	76	72
Otsego	S. W.	 2	**	91	88	82	75	68	77	72	73	77	79	.....	.....
Albion	S. C.	78 11	78	80 i	78	78	77	72	78	74	76	80	81	84	83
Ann Arbor	S. C.	79	80	90	91 g	90	77	73 a	77	72	75	74	75 a	85	84
Battle Creek	S. C.	 10	††	.....	88	88	77	65	72	69	71	76 c	79	84	74
Marshall	S. C.	78 5	79	88	87 g	87	76 c	66	74 d	71	75 b	76 d	76	89	85 b
Birmingham	S. E.	77	78	81	83	77	76	69	76	74	76	79	79	85	78

NOTE.—The observations in Table V. were reduced by Guyot's table, in Smithsonian Meteorological Tables, or by a table substantially the same as that. Computations for Ann Arbor and Albion in 1891 were made by the observers there. All other computations in Table V. were made at the office of the State Board of Health.

* The names of observers, their places of observation, and the counties in which these places are situated are stated in Exhibit 1, page 3.

† The full names of the divisions and the counties in each division are stated in Exhibit I., in a paper which follows, on weekly reports of sickness.

‡ Numbers in this column state the average annual Relative Humidity for periods of years ending in each case with Dec. 31, 1891. The small figures above and at the right of the numbers which state the Relative Humidity, denote the number of years included in the average.

§ This line is an average for only the stations at which observations were made tri-daily and from which statements, nearly complete, were received for every month in the year. It does not include Otsego, Rockland, Battle Creek and Harrisville.

¶ The average for 11 months is 73. ** For 10 months, 78. †† For 11 months, 77.

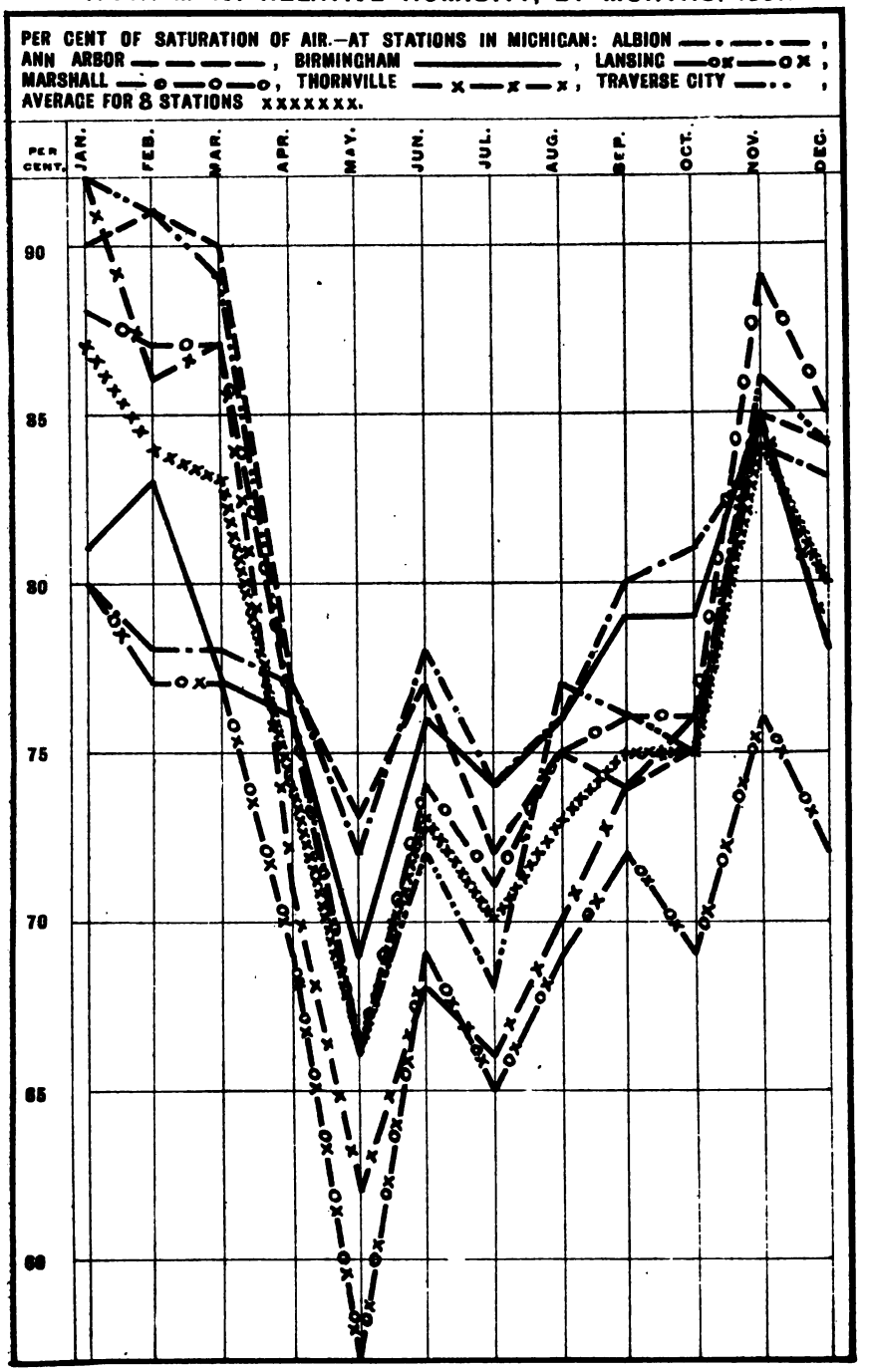
¶¶ Beginning with the year 1885, allowance must be made for Lansing in Table V., because of a change in location of the instruments. The amount of the variation by months is shown in Exhibit D., page 23, Report of 1886.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

a For 92 observations. b For 91 observations. c For 89 observations.
d For 88 observations. e For 86 observations. f For 84 observations.
g For 83 observations. h For 78 observations. i For 63 observations.
j For 61 observations.

Graphic representations of 8 representative lines in Table V. are given in Diagram IV., page 35.

DIAGRAM IV.—RELATIVE HUMIDITY, BY MONTHS, 1891.



FOGS.

For the year 1891, fog was reported at 104 morning observations, at 16 afternoon observations (at about 2 P. M.), at 31 evening observations (at about 9 P. M.), and 39 times during the day, no special time being mentioned, in many cases the same fog or fog at the same time, being reported by different observers. Fog was reported, at one or more stations at some time during the day, on 88 days.

EXHIBIT 21.—*Number of different days on which Fog was Observed at One or more of 17 Stations in Michigan* in 1891, and in each month of the year 1891.*

Year.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
88	9	9	3	9	0	11	3	7	18	4	7	8

* This Exhibit contains statements only for those localities from which reports were received for every month of the year, as follows: Rockland, Gulliver Lake, Traverse City, Alpena, Harrisville, Grand Haven, Battle Creek, Agricultural College, Albion, Port Huron, Thornville, Lansing, Ann Arbor, Kalamazoo, Parkville, Birmingham and Detroit.

NOTE.—Graphic representations of statements in Exhibit 22 are given in Diagram V., page 37.

EXHIBIT 22.—*Number of Observations at which Fog was Observed in Michigan in 1891, and in each Month of the year 1891. (Observation taken 3 times Daily,* at 17 Stations.†)*

Year.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
191	24	22	8	13	0	19	4	15	51	5	12	18

* At the U. S. Signal Service Stations the observations were made at 8 A. M. and 8 P. M., 75th Meridian time, unless otherwise stated in Exhibit 23.

† This exhibit contains statements only for those localities from which registers were received for every month of the year; the localities are stated in a foot-note to Exhibit 21 above.

DIAGRAM V.—CONCERNING FOGS IN MICHIGAN, IN 1891.

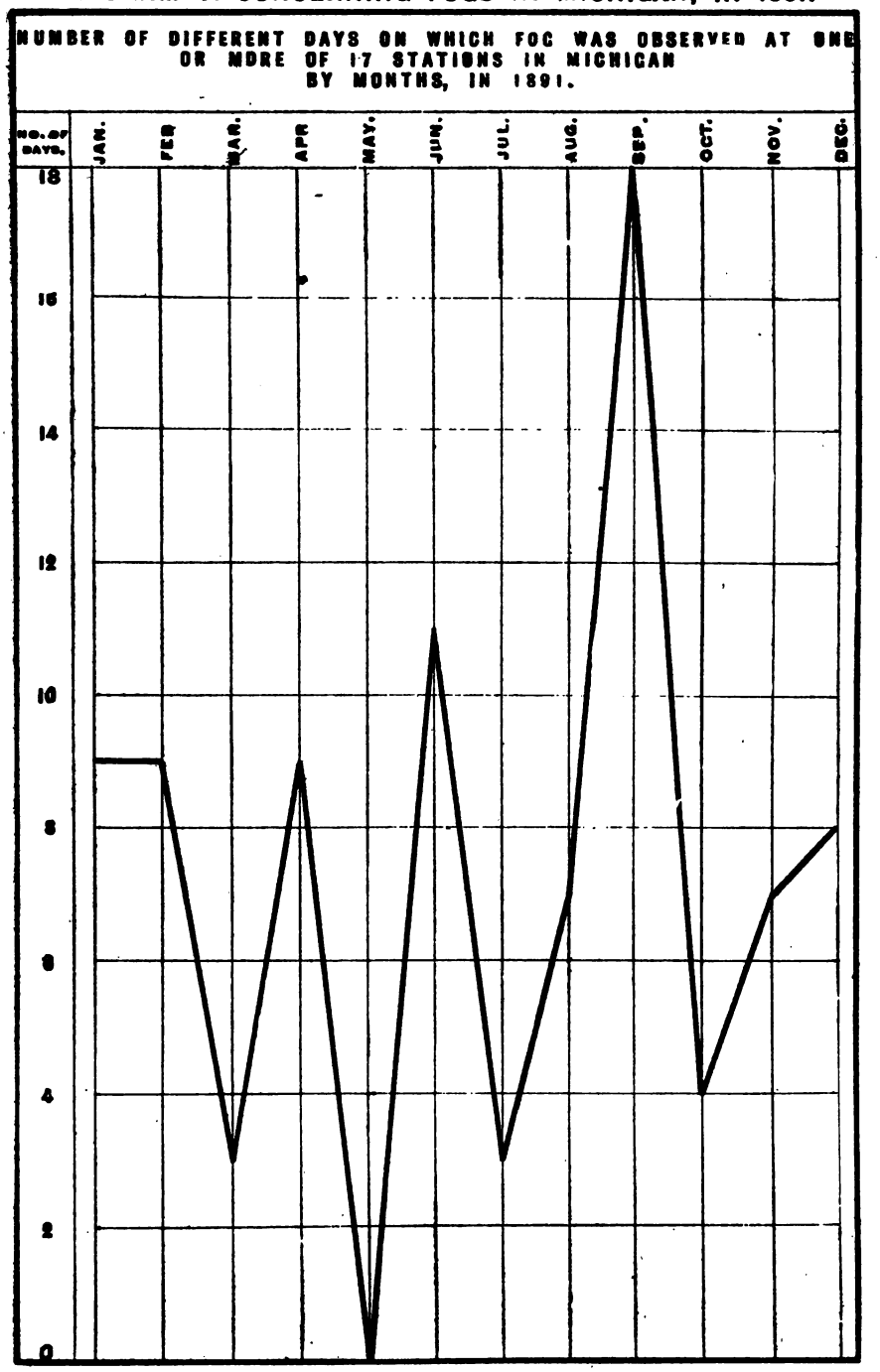


EXHIBIT 23. *Number of different Days on which Fog was recorded in 1891, and at 17 Stations*

Stations in Michigan.*	No. of Days in 1891.	January.			February.			Line number.
		Day of Month.	Hour of Observation.		Day of Month.	Hour of Observation.		
			A. M.	P. M.		A. M.	P. M.	
Rockland	10	0			7	morning		1
								2
								3
Gulliver Lake	8	0			12	7:00		4
								5
								6
Sault Ste. Marie	3							7
Traverse City	3	0			0			8
Alpena	4	29	11:00	till 6:00	24		7:00 till	9
					25	7:00 till	night	10
Harrisville	2	9			0			11
Grand Haven	4	11	early till 11:00		6	8:00		12
					20	noon till	5:30	13
Port Huron	15	9		night till	17		4:17	14
		10	10:00	night till				15
		11	7:00	till 6:25				16
		28		night till				17
		29	7:00	till 4:00				18
Thornville	12	29			9, 16	7:00	2 and 9	19
Agr'l College	13	10, 29	7:00		0			20
Lansing	20	1, 11, 10, 29	7:00		16		2:45†	21
					17		3:00†	22
Otsego		6	7:00		0			23
Albion	23	6		7:30†	16		4:30 till	24
		31		7:00†	17	6:00		25
					17		5:00†	26
Ann Arbor	16	1, 11, 20, 29	7:00		9	7:00		27
Battle Creek	7	0			0			28
Kalamazoo	4	0			18		7:00	29
Parkville	18	29			16, 20			30
Birmingham	12	29	7:00	2:00	16	7:00		31
					20		9:00	32
Detroit	10	29	7:00		16, 17		7:00	33
		31		7:00				34

* The names of observers, their places of observation, and the counties in which the places are situated are stated in Exhibit 1, page 3.
† Lifted in night.

in each Month, the dates and hours of Observation† when Fogs were recorded in Michigan.

Line number.	March.			April.			May.			June.		
	Day of Month.	Hour of Observation.		Day of Month.	Hour of Observation.		Day of Month.	Hour of Observation.		Day of Month.	Hour of Observation.	
		A. M.	P. M.		A. M.	P. M.		A. M.	P. M.		A. M.	P. M.
1	0	.....	.....	1, 11	7:00	.....	0	.....	.....	16	7:00	.....
2	.....	.....	.....	18	.....	2:00	.....	.....	.....	.....	.....	.....
3	.....	.....	.....	1, 10, 18	.....	9:00	.....	.....	.....	.....	.....	.....
4	0	.....	.....	16	7:00	2:00	0	.....	.....	10	7:00	.....
5	.....	.....	.....	17	.....	2 & 9	.....	.....	.....	.....	.....	.....
6	.....	.....	.....	22	7:00	.....	.....	.....	.....	.....	.....	.....
7	.....	.....	.....	.....	.....	.....	.....	.....	.....	0	.....	.....
8	0	.....	.....	0	.....	.....	0	.....	.....	0	.....	.....
9	0	.....	.....	0	.....	.....	0	.....	.....	0	.....	.....
10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
11	0	.....	.....	0	.....	.....	0	.....	.....	13, 14	.....	.....
12	0	.....	.....	0	.....	.....	0	.....	.....	0	.....	.....
13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
14	20	.....	.....	0	.....	.....	0	.....	.....	0	.....	.....
15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
19	8	7:00	2 & 9	14	.....	5 till 6	0	.....	.....	17, 19, 20, 21, 22	Morning	.....
20	0	.....	.....	0	.....	.....	0	.....	.....	17, 21	7:00	.....
21	0	.....	.....	28	.....	* Ev'n	0	.....	.....	17, 21	7:00	.....
22	.....	.....	.....	.....	.....	.....	.....	.....	.....	28	.....	Evening
23	0	.....	.....	0	.....	.....	0	.....	.....	0	.....	.....
24	0	.....	.....	0	.....	.....	0	.....	.....	0	.....	.....
25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
27	21	7:00	.....	0	.....	.....	0	.....	.....	0	.....	.....
28	0	.....	.....	0	.....	.....	0	.....	.....	21	7:00	.....
29	0	.....	.....	0	.....	.....	0	.....	.....	0	.....	.....
30	8, 21	.....	.....	0	.....	.....	0	.....	.....	20, 21, 23	.....	.....
31	0	.....	.....	0	.....	.....	0	.....	.....	17	7:00	.....
32	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
33	21	.....	.....	0	.....	.....	0	.....	.....	0	.....	.....
34	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

* Lifted in night.

† At the U. S. Signal Service Stations during 1891, the observations were made at 8 A. M. and 8 P. M., 75th Meridian time, unless otherwise stated in this exhibit.

NOTE.—Registers were received, but with no fog recorded thereon, from Marquette, Manistee, Marshall and Tecumseh, for each month in 1891. A cipher (0) indicates that a monthly register was received from the station with no fog recorded thereon.

EXHIBIT 23.—CONTINUED.—*Dates when*

Stations in Michigan.	July.			August.			September.			Line number.
	Day of Month.	Hour of Observation.		Day of Month.	Hour of Observation.		Day of Month.	Hour of Observation.		
		A. M.	P. M.		A. M.	P. M.		A. M.	P. M.	
Rockland	13		night	1	7:00		14		9:00	1
				31	7 till 8					2
Gulliver Lake	0			0			21		9:00	3
							22	7:00	2:00	4
							26	7:00		5
Sault Ste. Marie	0			0			21, 22, 26			6
Traverse City	0			0			21		9:00	7
Alpena	0			0			22			8
Harrisville	0			0			0			9
Grand Haven	0			0			0			10
Port Huron	0			0			1, 16, 20, 22, 24			11
Thornville	0			14		evening	1	morning		12
Agr'l College	0			31	7:00		1, 11, 16, 22, 26, 27	7:00		13
Lansing	0			18, 31	7:00		1, 11, 16, 22	7:00		14
				30		9:00				15
										16
Otsego	28	7:00		31	7:00		0			17
Albion	28	7:00		14		9:00	1, 14, 16, 22	7:00		18
				15	7:00		15		9:00	19
				17		night till				20
				18	6:30					21
				30		8:00 till				22
				31	10:00					23
Ann Arbor	0			0			8, 9, 10, 19, 20, 22, 23, 25	7:00		24
										25
										26
Battle Creek	28	7:00		31	7:00		13, 23, 26	7:00		27
Kalamazoo	0			0			1, 26	7:00		28
Parkville	28			15, 31			1, 8, 9, 10			29
Birmingham	31	7:00		18	7:00		20, 23, 24	7:00		30
										31
Detroit	0			0			1, 23, 24			32

Fogs were recorded in 1891.

Line number.	October.			November.			December.		
	Day of Month.	Hour of Observation.		Day of Month.	Hour of Observation.		Day of Month.	Hour of Observation.	
		A. M.	P. M.		A. M.	P. M.		A. M.	P. M.
1	0			0			0		
2									
3	0			0			0		
4									
5									
6	0			0			0		
7	0			5, 8	7:00		0		
8	0			0			0		
9	0			0			0		
10	0			6			0		
11	0			0			10, 14, 20		
12	0			0			0		
13	9	7:00		3	7:00		0		
14	0			6	7:00		11	7:00	
15							14	9:00*	
16							24		9:00
17	9	7:00							
18	9, 10	7:00		22, 23	7:00		0		
19	5, 15		9:00	2		8:00*	0		
20									
21									
22									
23									
24	0			22	7:00		20	7:00	
25							24		
26							25	morning	
27	0			6	7:00		0		
28	0			6	7:00		0		
29	0			6			11, 12		
30	0			0			20, 25	7:00	
31							14, 25		2:00
32	0			0			20, 22		

* Lifted in night.

TABLE VI.—*Average Per Cent of Cloudiness for the Year, and for each Month of the Year 1891, at each of 12 Stations in Michigan, and also the Average line for 11 Stations. Average of Observations made Daily at 7 A. M., 2 P. M. and 9 P. M., by Observers* for the State Board of Health.*

Stations in Michigan.*	Division of the State.†	Average Per Cent of Cloudiness.													
		Year.		Months, 1891.											
		Norm.‡	1891.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 11 Stations§	------	------	55	79	70	67	50	40	48	38	47	33	52	80	57
Rockland	U. P.	------ 5	54	78	78	52 a	39 g	31 n	43 k	42 e	43 e	41 i	59 o	77 p	70 j
Gulliver Lake	U. P.	56 10	55	68	60	59	50 e	34 m	43	54 e	46 b	41 d	62 a	83 d	66
Traverse City	N. W.	60 7	56	82	74	62	49	34	42	37	48	36	62	89	60
Harrisville	N. E.	60 15	61	84	75	60	53	55	50	50	59	40	61	84	64
Thornville	B.&E.	52 28	48	84	68	64	40	26	42	26	39	24	40	77	53
Agricultural College	C.	58 13	54	70	68	71	55	36	50	37	44	35	51	80	56
Lansing (S. B. of H.)	C.	56	58	79	74	70	56	51	54	44	47	37 d	51 b	81	53
Otsego	S. W.	------ 2	¶	80	66	70	47	28	48	30	39	24	44	------	------
Albion	S. C.	64 12	65	84	68	83	65	56	61	47	61	37	61	85	66 a
Ann Arbor	S. C.	58	56	79	75	67	54	40	54 c	38 a	55 d	31 d	49	74 c	55 b
Battle Creek	S. C.	--- 11	50	74	64	69	48	32	45	32	37	24	50	79	49
Marshall	S. C.	53 5	46	71 b	58 i	67 d	43 e	33 c	38 i	20 d	34 b	20 k	42 k	75 e	46 i
Birmingham	S. E.	59	56	82	72	70	52	45	52	41	50	35	46	79	52

* The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit 1, page 3.

† The full names of divisions and the counties in each division are stated Exhibit I. in a paper which follows on weekly reports of sickness.

‡ Numbers in this column state the average per cent of cloudiness for periods of years ending in each case with Dec. 31, 1891. The small figures above and at the right of numbers which state the per cent of cloudiness, denote the number of years included in the average.

NOTE TO TABLE VI.—Computations of average per cent of cloudiness were made and furnished by the observers at Ann Arbor and Albion for each month in 1891. All other computations in Table VI. were made at the office of the State Board of Health.

§ This line is an average for only the stations at which tri-daily observations were made and from which statements, nearly complete, were received for every month of the year. It does not include the line for Otsego. The line for Gulliver Lake is not included in "Av. for 11 Stations." The registers were received too late.

¶ The average for 10 months is 48.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

a For 92 observations. b For 91 observations. c For 89 observations. d For 88 observations.
e For 86 observations. f For 85 observations. g For 84 observations. h For 83 observations.
i For 82 observations. j For 81 observations. k For 79 observations. l For 75 observations.
m For 68 observations. n For 64 observations. o For 63 observations. p For 59 observations.

Graphic representations of 8 representative lines in Table VI., are given in Diagram No. VI., page 43.

DIAGRAM VI.- AV. PER CT. CLOUDINESS, BY MONTHS, 1891.

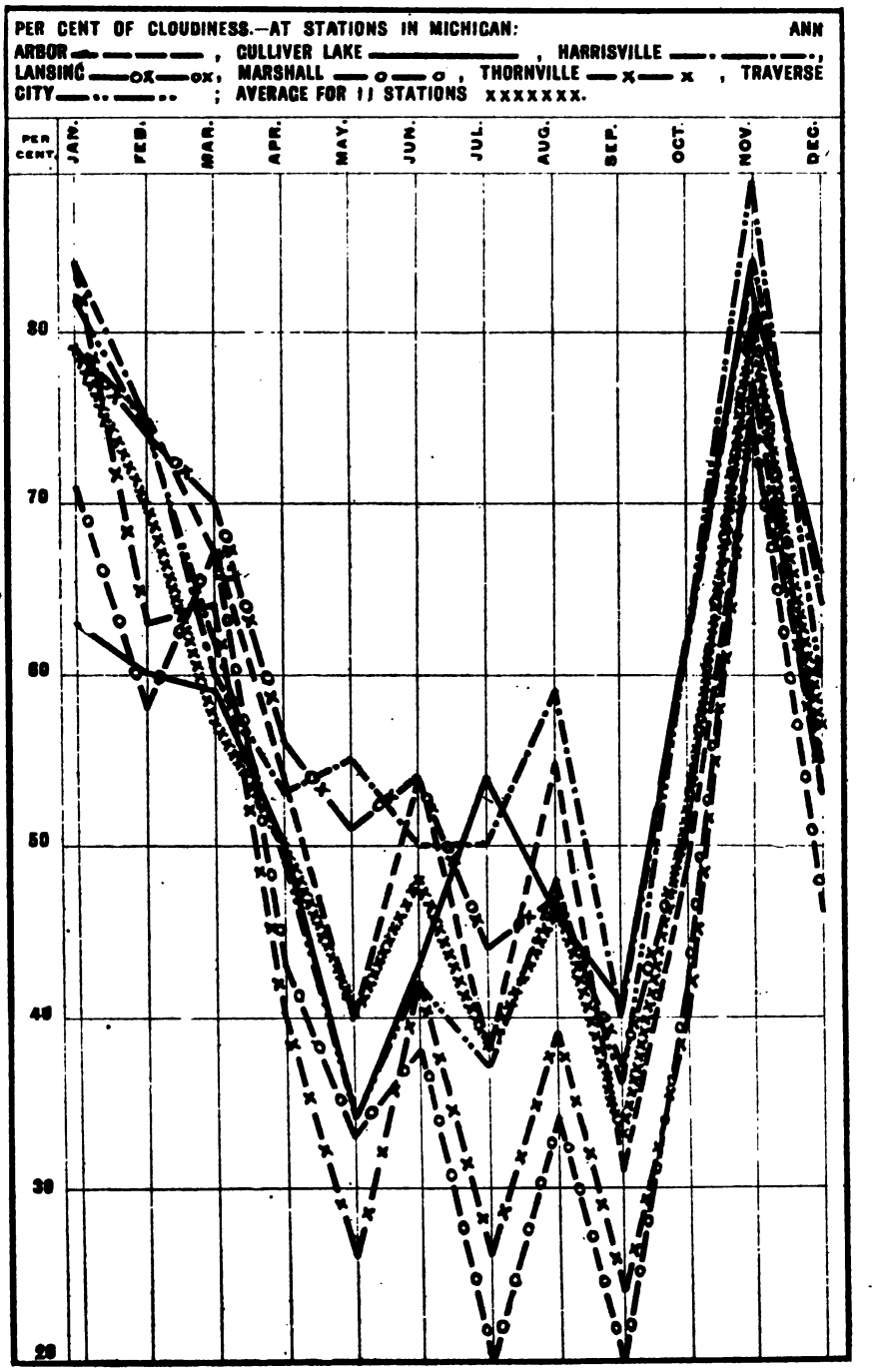


EXHIBIT 24.—*Average Per Cent of Cloudiness by year and Months, in 1891*, Compared with Annual and Monthly Averages for 1890, and for 14 Years 1877-90. These Averages are for Groups of several Stations in Michigan.*

Years, etc.	Per Cent of Cloudiness.												
	Annual Av.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 14 years, 1877-90*..	56	70	64	58	51	50	48	41	43	46	59	68	75
1890 (12 stations).....	56	72	69	56	44	60	48	35	43	48	71	61	66
1891 (11 stations).....	55	79	70	67	50	40	48	38	47	33	52	80	57
In 1891 Greater than Av. for 14 years, 1877-90	.....	9	6	9	.....	.....	0	.....	4	.....	.....	12	.....
In 1891 Less than Av. for 14 years, 1877-90	1	.....	.....	.....	1	10	.....	3	.....	13	7	.....	18
In 1891 Greater than in 1890	.....	7	1	11	6	.....	0	3	4	.....	.....	19	.....
In 1891 Less than in 1890.....	1	.....	.....	.....	.....	20	.....	.....	.....	15	19	.....	9

* Mendon for 1877-83; Nirvana for 1877-79 and first four months of 1880; Reed City for last eight months of 1880 and 1881-85; Niles for 1878-81; Benton Harbor for 1877-78 and 1880; Coldwater, Woodmere Cemetery for 1877-79; Otisville for 1878-80, 1882; Washington for 1879-83; Ypsilanti for 1877, 1879; Petoskey for 1878-79; Fife Lake for 1877; Ionia for 1880, 1883-85; Adrian for 1880; Hillsdale for 1880, 1882-84; Parkville for 1881-82; Winfield for 1881, 1883; Mallory Lake for first seven months of 1881, Hudson for last five months of 1881; Hastings for 1882; Port Austin for 1883; Manistique, Swartz Creek for 1884-5; Mackinaw City for 1884-87; Pentwater, East Saginaw for 1886; Kalamazoo for 1877-89; Marquette for 1879-87; Escanaba for 1880-87; Alpena, Grand Haven, Port Huron for 1879-87; Detroit for 1877; 1879-87; Otsego for 1886-87, 1890; Gulliver Lake for 1887-90; Alma for 1890; Tecumseh for 1877-85; Birmingham for 1887-90; Thornville for 1877-90; Battle Creek for 1877-80, 1882-85, 1888-89; Lansing for 1879-90; Agricultural College for 1877, 1881-90; Ann Arbor for 1880-90; Marshall for 1881-90; Harrisville for 1882, 1885-90; Traverse City for 1882-90; Albion for 1890.

EXHIBIT 25.—*Comparison of the Average Per Cent of Cloudiness in the Year and each Month of the Year 1891, with Averages for the 27 Years, 1864-90, and for the Year 1890. Observations made at 7 A. M., 2 P. M., and 9 P. M., Daily, by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Mich.*

Years, etc.	Per Cent of Cloudiness.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov	Dec.
Av. 27 years, 1864-90.	58	73	65	61	56	51	50	45	46	48	59	66	75
1890.....	55	72	69	56	46	58	50	33	42	48	70	57	62
1891.....	54	70	68	71	55	36	50	37	44	35	51	80	56
In 1891 Greater than Av. for 27 years, 1864-90. ...	.....	.....	3	10	.....	.....	0	.....	.....	.....	.....	14	.....
In 1891 Less than Av. for 27 years, 1864-90	4	3	.....	.....	1	15	0	8	2	13	8	.....	19
In 1891 Greater than in 1890.....	.....	.....	.....	15	9	.....	.....	4	2	.....	.....	23	.....
In 1891 Less than in 1890.....	1	2	1	.....	.....	22	0	.....	.....	13	19	.....	6

EXHIBIT 26.—*Dates of Auroras Observed and recorded at 13 Stations in Michigan during the Year 1891.*

Stations.	Dates of Auroras recorded in 1891.											
	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Gulliver Lake	....	11	14	7, 8, 12, 28	13	.....	.....	.....	2,4,8,9 10, 29	8, 23, 24	.....	6
Rockland	....	.....	.....	7, 8, 9, 11, 12	.....	.....	12	3, 9 *	8, 9, 10	23	.....	.....
Marquette	....	.....	.....	7, 8	.....	.....	.....	28	9, 10, 11	.....	.....	.....
Traverse City	....	.....	.....	7	.....	.....	.....	.....	.....	.....	.....	.....
Detroit	....	.....	.....	8	.....	.....	.....	28	9	.....	.....	.....
Lansing	....	.....	.....	7	.....	.....	.....	28	9	.....	.....	.....
Sault Ste. Marie	....	.. ....	.....	.....	.....	4, 5, 8	.....	3, 4, 9, 12, 13, 23, 31	1, 8, 9, 11	.....	.....	.....
Alpena	....	.....	.....	.....	.....	.....	.....	28	11	.....	.....	27
Grand Haven	....	.....	.....	.....	.....	.....	.....	28	8, 9, 11	.....	.....	.....
Thornville	....	.....	.....	.....	.....	.....	.....	28	8, 9, 11	27	.....	.....
Manistee	....	.....	.....	.....	.....	.....	.....	.....	9	.....	.....	.....
Ann Arbor	....	.....	.....	.....	.....	.....	.....	.....	8, 9	.....	.....	.....
Parkville	....	.....	.....	.....	.....	.....	.....	28	.....	.....	.....	.....

* W. G. Gates, M. D., observer for the State Board of Health at Rockland, sent a clipping from a newspaper, as follows:—

"A Peculiar Phenomenon.

"A curious and unexplained phenomenon attended the storm of last Saturday evening. Long after sunset, as late, in fact, as 10:30 P. M., a bright, luminous glow was seen against the black clouds in the northwest. It was similar to the reflection cast by a fire, but as it was witnessed all over the Lake Superior region and was especially marked along the lake shore, it must have been due to meteorological conditions. It was entirely different from the aurora and had a very slow but even movement from west to east. The effect in a spectacular sense was wierdly grand, and was, of course, enhanced by the dense blackness of the rain clouds. A similar phenomenon was witnessed by some, under like conditions, about three years ago, except that the motion of the luminous area was in the opposite direction.

"At Portage Lake the setting sun sent a sharply defined shaft of intense light over a portion of Houghton so that it seemed to spectators on the Hancock side that everything in the line of the illumination was plated with silver. Birds on the wing assumed a silvery hue as they entered the radiance, and the majestic tower and bulk of the mining school shone like a mass of polished nickel. The track of this marvelous shaft of light was as sharply defined as a ray of light let into a darkened room. And yet twilight had hardly set in.—*Ishpeming Democrat.*"

METEORS.

March 14, 9:00 P. M., 1 meteor, West. Course N. W. April 19, 9:00 P. M., 1 meteor, West. Course N. W. August 4, 10 P. M., 1 meteor, West. Course, S. W.—*Lansing.*

EXHIBIT 27.—*Dates of Solar and Lunar Halos,*

Line number.	Stations.	Dates of Halos Recorded, January. Solar.	January. Lunar.	February. Solar.	February. Lunar.	March. Solar.	March. Lunar.	April. Solar.	April. Lunar.	May. Solar.	May. Lunar.
1	Albion	----	19, 20	----------	17	----------	------	----------	{ 13, 16, 19, 20 }	----------	----
2	Kalamazoo	----	20	----------	18	----------	------	----------	----------	----------	----
3	Lansing	28	20, 24, 30	5, 11, 19	{ 19, 22, 21, 25 }	10	24, 25	19, 22, 29	----------	4, 11	----
4	Marquette	----	----------	11, 19	14, 19, 23	----------	16	9, 17	----------	2, 22, 23	----
5	Alpena	----	----------	19	15, 19, 22	----------	16	----------	----------	----------	23
6	Grand Haven	----	----------	----------	----------	10, 12, 24	15, 16	----------	----------	----------	----
7	Port Huron	----	----------	----------	----------	10	------	9	----------	----------	----
8	Detroit	----	----------	----------	----------	----------	17, 18	----------	----------	----------	----
9	Sault Ste. Marie	----	----------	----------	----------	----------	------	----------	----------	----------	----
10	Traverse City	----	----------	----------	----------	----------	------	5	----------	----------	----

Corona, Feb. 19, 28; March 16; April 12, 13, 19; June 12, 15.—*Lansing.*
Parhelia, Feb. 11, 19; Dec. 5.—*Lansing.*
Parhelia, Mar. 5.—*Rockland.*
Lunar corona, Nov. 18.—*Grand Haven.*

EXHIBIT 28.—*Inches of Rain and Melted Snow by Year and Months, in 1891, compared with Annual and Monthly Averages for 1890, and for the 14 Years, 1877-90. These Averages are for Groups of several Stations in Michigan.*

Years, etc.	Inches of Rain and Melted Snow. Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 14 years, 1877-90*..	34.97	2.27	2.57	2.28	2.52	3.51	3.94	3.23	3.19	3.24	3.40	3.05	2.65
1890 (20 stations).....	30.20	3.53	2.40	2.12	3.37	4.80	3.74	1.47	3.63	2.09	4.97	2.43	1.70
1891 (17 stations).....	31.66	1.91	3.13	2.74	2.03	1.33	2.53	2.55	4.41	1.92	1.71	4.86	2.54
In 1891 Greater than Av. for 14 years, 1877-90	------	------	.56	.46	------	------	------	------	1.22	------	------	1.81	------
In 1891 Less than Av. for 14 years, 1877-90.	3.31	.36	------	------	.49	2.18	1.41	.68	------	1.32	1.69	------	.11
In 1891 Greater than in 1890	1.46	------	.73	.62	------	------	------	1.08	.78	------	------	2.43	.84
In 1891 Less than in 1890	------	1.62	------	------	1.34	3.47	1.21	------	------	.17	3.26	------	------

* Benton Harbor for 1877-78; Mendon for 1877-78, 1880-82; Niles for 1878-81; Nirvana for 1877-79, and to and including April 25, 1880; Reed City from April 26 to December 31 inclusive in 1880, and for 1881-85; Coldwater, Woodmere Cemetery for 1877-79; Otisville for 1878-80, 1882; Escanaba for 1880-87; Washington for 1880-83; Fife Lake, Ypsilanti for 1887; Winfield for 1881-83; Mallory Lake for first seven months of 1881, Hudson for last five months of 1881; Hastings for 1882; Hillsdale for 1882-84; Ionia for 1883-84; Manistique, Swartz Creek for 1884-85; Mackinaw City for 1884-87; Pentwater, East Saginaw for 1886; Gulliver Lake for 1887-90; Manistee for 1889-90; Alma, Otsego for 1890; Hudson for 1886, 1888-89; Battle Creek for 1877-78, 1884, 1888; Thornville, Kalamazoo, Detroit for 1877-90; Agricultural College for 1877-78, 1881-90; Marquette for 1879-84, 1886-90; Alpena, Port Huron for 1879-90; Grand Haven for 1879-88, 1890; Lansing for 1880-90; Harrisville for 1881-82, 1887-90; Ann Arbor for 1881-82, 1885-86, 1888-90; Marshall for 1881-84, 1886-90; Traverse City for 1882-90; Parkville for 1882-83, 1885-90; Birmingham for 1887-90; Albion for 1890.

Recorded on the Monthly Registers in 1891.

Months, 1891.														
June.		July.		August.		September.		October.		November.		December.		Line number.
Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.	
----	------	------	------	------	------	------	----------	------	------	----------	18	----------	----------	1
----	------	------	------	------	------	------	----------	------	------	----------	------	----------	----------	2
----	------	------	------	------	------	------	12, 15, 17	------	------	6	6	8, 9, 21, 27, 28	8, 21	3
----	------	------	------	------	------	------	----------	1, 8	------	15, 18, 20	9	----------	7, 11, 13	4
----	------	------	------	------	------	------	----------	------	------	----------	------	21	----------	5
----	------	------	------	------	------	------	----------	------	------	11	------	----------	8, 9, 13, 19	6
----	------	------	------	------	------	------	----------	------	13	----------	------	----------	8, 9	7
----	14, 15	------	------	------	------	------	----------	------	------	----------	------	1	18	8
5	------	------	------	------	------	------	----------	------	------	----------	------	----------	11	9
----	------	------	------	------	------	------	----------	------	------	----------	------	----------	----------	10

EXHIBIT 29.—*Comparison of the Rainfall during the Year and during each Month of the Year 1891, with that for the Year 1890, and with the Average for the 27 Years, 1864-90. Observations made by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Michigan.*

Years, etc.	Inches of Rain and Melted Snow.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 27 Yrs., 1864-90	31.70	1.86	2.04	2.44	2.38	3.19	4.10	3.25	2.73	2.91	2.60	2.28	1.98
1890	31.92	2.31	1.79	1.54	3.20	4.98	3.92	0.92	3.60	1.67	4.57	2.30	1.12
1891	24.78	0.82	2.20	2.41	1.74	1.63	2.55	1.88	4.52	1.10	0.82	3.34	1.47
In 1891 Greater than Av. for 27 years, 1864-90	------	------	0.16	------	------	------	------	------	2.09	------	------	1.06	------
In 1891 Less than Av. for 27 years, 1864-90	6.92	1.04	------	0.03	0.64	1.56	1.55	1.37	------	1.81	1.78	------	0.46
In 1891 Greater than in 1890	------	------	0.41	0.87	------	------	------	0.96	1.22	------	------	1.04	0.35
In 1891 Less than in 1890	7.14	1.49	------	------	1.46	3.35	1.37	------	------	0.57	3.75	------	------

TABLE VII.—*Inches of Rain and Melted Snow for the Year, and for each Month of the Year 1891, at 18 Stations in Michigan,—as compiled from Daily Observations made by Observers* for the State Board of Health, and for the U. S. Signal Service.*

Stations in Michigan.* (Those of U. S. Signal Service in Italics.)	Division of the State.†	Inches of Rain and Melted Snow.													
		Year.		Months, 1891.											
		Norm. ‡	1891.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 17 Stations§	.....	.....	31.66	1.91	3.13	2.74	2.03	1.33	2.53	2.55	4.41	1.92	1.71	4.86	2.54
Rockland	U. P.	 5	24.11	2.63	2.70	2.15	0.82	0.26	2.47	1.31	1.85	1.55	2.51	2.76	3.10
Gulliver Lake	U. P.	35.98 6	33.37	3.34	3.45	4.07	2.45	0.02	1.64	3.05	4.04	1.29	1.99	4.55	3.48
Marquette	U. P.	31.49	33.78	4.08	3.42	4.45	2.18	0.21	2.32	2.74	4.71	1.21	2.56	3.32	2.58
Sault Ste. Marie	U. P.	 3	‖	.....	.....	.....	.....	.....	0.95	2.22	3.44	0.98	2.76	5.35	3.05
Manistee	N. W.	31.57 10	28.79	2.32	2.25	2.92	0.91	0.12	2.43	1.86	3.16	2.40	1.95	5.03	3.44
Traverse City	N. W.	28.60 19	34.29	2.38	3.10	2.16	1.05	1.05	2.81	0.89	3.46	2.43	3.07	7.51	4.38
Alpena	N. E.	30.40 5	31.61	2.26	2.46	3.47	1.21	0.10	2.29	2.05	7.80	1.79	1.43	3.79	2.96
Harrisville	N. E.	32.54 2	41.05	4.17	2.92	3.87	2.38	0.09	1.87	4.09	9.22	2.17	1.04	4.64	4.59
Grand Haven	W.	29.26 17	26.26	2.13	2.45	2.48	1.76	1.31	3.32	1.81	1.47	0.89	1.38	5.41	1.85
Port Huron	B. & E.	32.19 15	33.31	1.81	2.33	2.18	2.60	2.17	2.13	3.93	4.28	3.28	1.86	5.26	1.96
Thornville	B. & E.	33.60 28	36.74	1.05	3.94	2.40	2.13	2.37	2.39	4.61	3.07	3.96	3.15	4.82	2.85
Agr'l College	C.	31.45 12	24.78	0.82	2.20	2.41	1.74	1.63	2.55	1.88	4.82	1.10	0.82	3.34	1.47
Lansing (S. B. of H.)	C.	33.79	29.05	1.07	2.35	2.48	2.45	1.84	2.26	2.91	5.27	1.37	0.77	4.39	1.89
Otsego	S. W.	 2	¶	1.47	5.43	3.41	2.80	2.05	2.79	3.24	2.67	2.92	1.22	.....	.....
Albion	S. C.	38.44 4	33.68	1.57	3.66	2.78	2.63	1.32	2.27	1.83	5.93	1.66	1.02	6.02	2.49
Ann Arbor	S. C.	29.21	28.51	1.02	3.61	2.02	1.77	2.00	2.70	2.54	2.54	1.59	1.88	4.39	2.45
Battle Creek	S. C.	.....	**	.....	.....	.....	2.05	2.22	1.12	2.75	2.29	0.51	.....	.....	.....
Kalamazoo	S. C.	.....	††	1.56	3.35	.....	.....	.....	.....	.....	.....	1.40	0.97	4.96	1.47
Hudson	S. C.	 6	‡‡	.....	.....	2.99	2.47	1.83	3.10	2.54	3.93	1.69	1.75	5.92	3.60
Marshall	S. C.	32.99 11	32.56	1.51	3.66	2.73	2.26	2.31	2.73	2.21	6.13	1.67	1.12	4.77	1.46
Parkville	S. C.	44.37 5	35.32	1.42	5.95	2.89	3.29	2.50	2.34	2.61	3.87	1.50	0.86	6.30	1.79
Birmingham	S. E.	30.59 20	35.02	1.23	3.06	2.96	2.56	1.17	3.87	3.19	4.61	2.78	1.74	5.59	2.26
Detroit	S. E.	32.97	28.83	0.92	3.07	2.23	2.72	1.68	2.28	2.90	2.86	1.33	1.93	5.30	1.61

* The names of observers, their places of observation, and the counties in which these places are situated are stated in Exhibit 1, page 3.

† The names of divisions, and the counties in each, are stated in Exhibit I, in a paper which follows on weekly reports of sickness.

‡ Numbers in this column state the average annual rainfall for periods of years ending in each case with Dec. 31, 1891. The small figures above and at the right of numbers which state the rainfall, denote the number of years included in the average.

§ This line is an average for only the stations from which statements, nearly complete, are given for every month of the year. It does not include Hudson, Battle Creek, Otsego and Sault Ste. Marie. Gulliver Lake is not included in "Av. for 17 Stations." The registers were received too late.

‖ The total rainfall for 7 months is 19.25 inches. ¶ For 10 months, 28.00 inches.

** For 6 months, 10.94 inches. †† For 6 months, 13.71 inches. ‡‡ For 10 months, 29.82 inches.

NOTE.—The computations of amount of rainfall were furnished by the observers at Detroit, Alpena, Grand Haven, Port Huron, Ann Arbor, Manistee, Albion, Kalamazoo, Sault Ste. Marie and Marquette for the year. All other computations in Table VII. were made in the office of the Secretary of the State Board of Health.

The lines for 8 representative stations in Table VII. are graphically represented in Diagram VII., page 49.

DIAGRAM VII.- RAINFALL, BY MONTHS IN 1891.

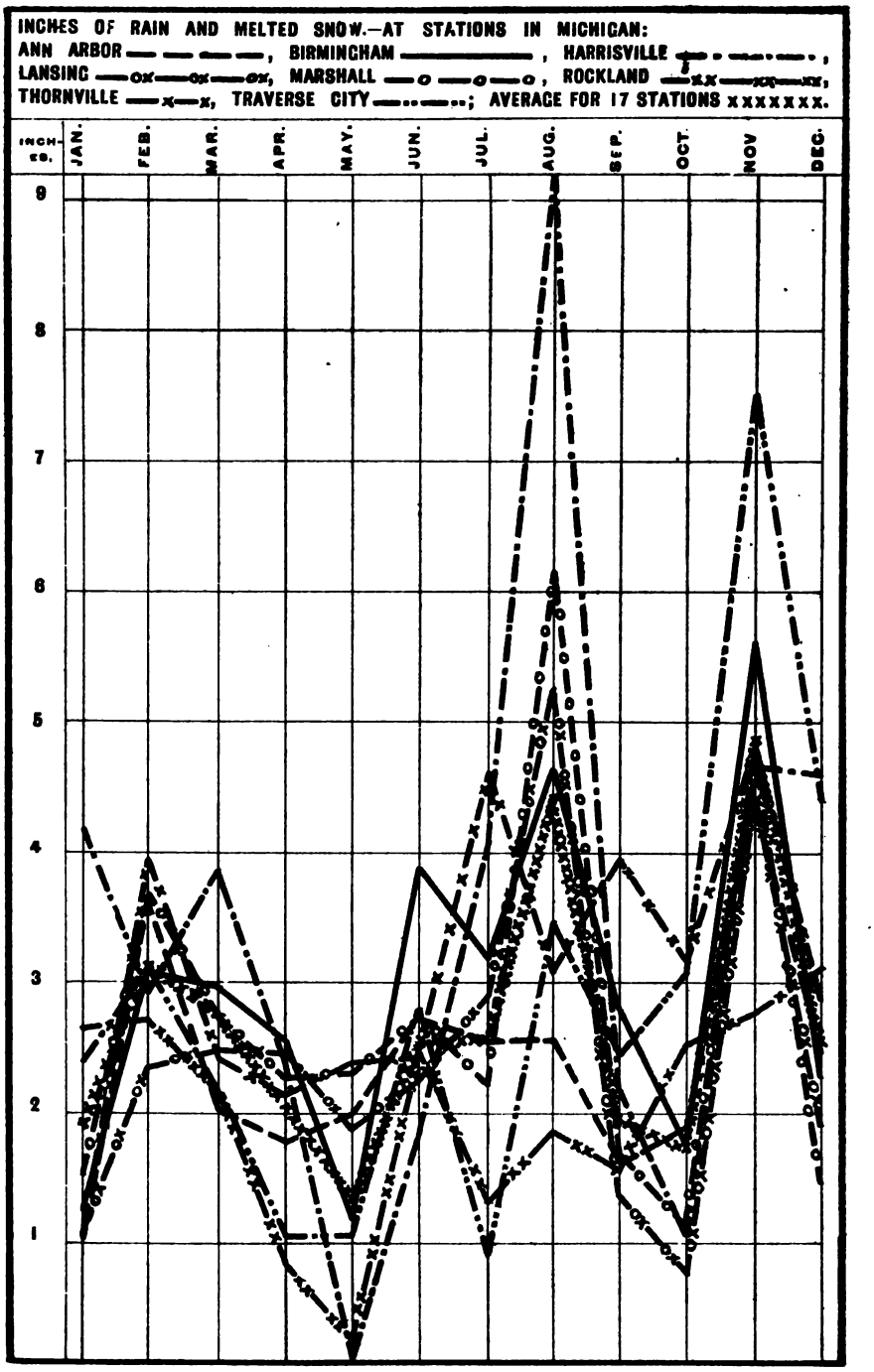


TABLE VIII.—*Relative Amount of Ozone in the Atmosphere, by Day, during the Year and during each Month of the Year 1891, at 11 Stations, also average lines for 8 Stations and for 3 Stations in Michigan, as indicated by Averages of Observations made Daily by exposing Test-paper prepared according to Schönbein's formula, from 7 A. M. to 2 P. M.—Recorded according to a scale of 10 Degrees of Coloration of the Test-paper (greatest coloration by Ozone equals 10) by Observers for the State Board of Health, and for the U. S. Signal Service.**

Stations in Michigan.† (Those of the U. S. Signal Service in Italics.)	Divisions of the State.†	Degrees of Coloration of Test-paper—Day Observation.**												
		Year.		Months, 1891.										
		Norm. ‡	1891.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 8 Stations §	.....	.....	3.99	4.20	4.18	4.46	4.02	4.40	4.10	3.94	3.92	3.82	3.85	3.45	3.59
Av. for 3 Stations ‖	.....	.....	3.18	3.35	3.54	3.82	3.75	4.04	4.00	3.40	3.16	2.86	2.33	1.75	2.20
Rockland	U. P.	.....	6.34	7.38	6.91	6.64	5.92	6.25 b	5.91 b	6.00 d	5.47 e	5.34 d	7.10 f	6.58 g	6.57 h
Marquette	U. P.	.....	¶	6.19	.....	5.12	2.92	3.82	2.79	2.86	3.54	3.38	3.50	1.29	4.02
Manistee	N. W.	 10	††	.....	.....	.....	.....	5.80	4.76	4.24	4.31	3.99	4.24	4.86	5.69
Traverse City	N. W.	4.28	6.93	6.77	7.05	7.25	6.72	7.38	7.69	7.15	7.18	6.72	5.98	5.69	6.60
Alpena	N. E.	 7	3.38	4.00	4.77	4.32	3.86	2.82	3.06	2.95	2.77	2.22	2.98	3.22	3.63
Harrisville	N. E.	4.32	3.84	5.09	4.13	4.20	3.89	3.38	3.46	3.34	3.70	3.78	3.76	3.59	3.73
Grand Haven	W.	.....	3.64	3.12	3.29	4.09	4.29	5.26	5.16	4.10	4.20	3.42	2.79	1.72	2.24
Port Huron	B. & E.	 15	2.53	2.98	2.55	3.06	3.09	4.03	3.79	3.15	2.51	2.95	1.21	0.32	0.74
Thornville	B. & E.	2.87 18	3.52	3.80	3.63	4.48	3.32	3.06	3.19	2.73	3.09	3.25	3.47	4.02	4.15
Lansing (S. B. of H.)	C.	3.31	3.18	3.35	3.45	3.25	3.89	4.42	3.42	3.63	2.96	2.88	2.24	2.16	2.53
Otsego	S. W.	 2	‡‡	2.29	2.63	3.09	2.46	2.48	2.16	1.79	2.12	1.88	1.69	.....	.....
Albion	S. C.	3.31 12	2.99	2.42	2.66	3.41	2.56	4.06	3.36	3.47	3.64	3.56 c	2.53	1.99	2.21 e
Ann Arbor	S. C.	2.91	2.38	2.74	3.19	4.09	3.29	3.32	2.42	1.76	2.28	1.90 b	1.64	1.06	0.92
Battle Creek	S. C.	.....	1.38	1.45	1.59	2.09	1.79	1.71	1.46	0.98	1.47	1.74	0.79	1.29	0.21
Kalamazoo	S. C.	 11	§§	2.64	2.88	.....	.....	.....	.....	.....	.....	2.62	1.74	1.46	1.89
Marshall	S. C.	3.35	2.84	2.03	2.45	2.32	2.59	3.29	3.36	3.41	3.02	3.12	4.05	2.49 e	1.98 a
Birmingham	S. E.	.....	‖‖	4.35	4.34	3.70	3.76	4.06	4.59	3.37	.....	3.78	1.95	2.29	2.17

* At the stations of the U. S. Signal Service and Kalamazoo during the year 1891, the observations were made by exposing the test-paper as follows: At Manistee, Grand Haven, Alpena, and Marquette from 8 A. M. to 8 P. M. At Port Huron from 8 A. M. to 3 P. M., all 75th meridian time. The corresponding local time for some of these stations is stated in a foot-note to Table 11., page 24.

† The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit I, page 3. The full names of the divisions and the counties in each division are stated in Exhibit I., in a paper which follows, on weekly reports of sickness.

‡ Numbers in this column state the average annual relative amount of ozone by day for periods of years ending in each case with Dec. 31, 1891. The small figures above and at the right of numbers which state the average, denote the number of years included in the average.

§ This line is an average for only the stations from which statements, nearly complete, were received for every month in the year. It does not include Birmingham, Otsego, Kalamazoo, Battle Creek and the Signal Service Stations.

‖ This is an average line for Alpena, Grand Haven and Port Huron.

¶ The average for 11 months is 3.54. †† For 8 months, 4.74. ‡‡ For 10 months, 2.26. §§ For 6 months, 2.21. ‖‖ For 11 months, 3.49.

** Allowance has been made for difference in sensitiveness of test-paper in this table.

a, b, c. In the columns from January to December, inclusive, the a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

a For 30 days. b For 29 days. c For 28 days. d For 27 days. e For 26 days. f For 21 days. g For 19 days. h for 15 days.

Seven lines in this table are graphically represented in Diagram VIII., page 51.

DIAGRAM VIII.–OZONE, AVERAGE BY DAY, MONTHS IN 1891.

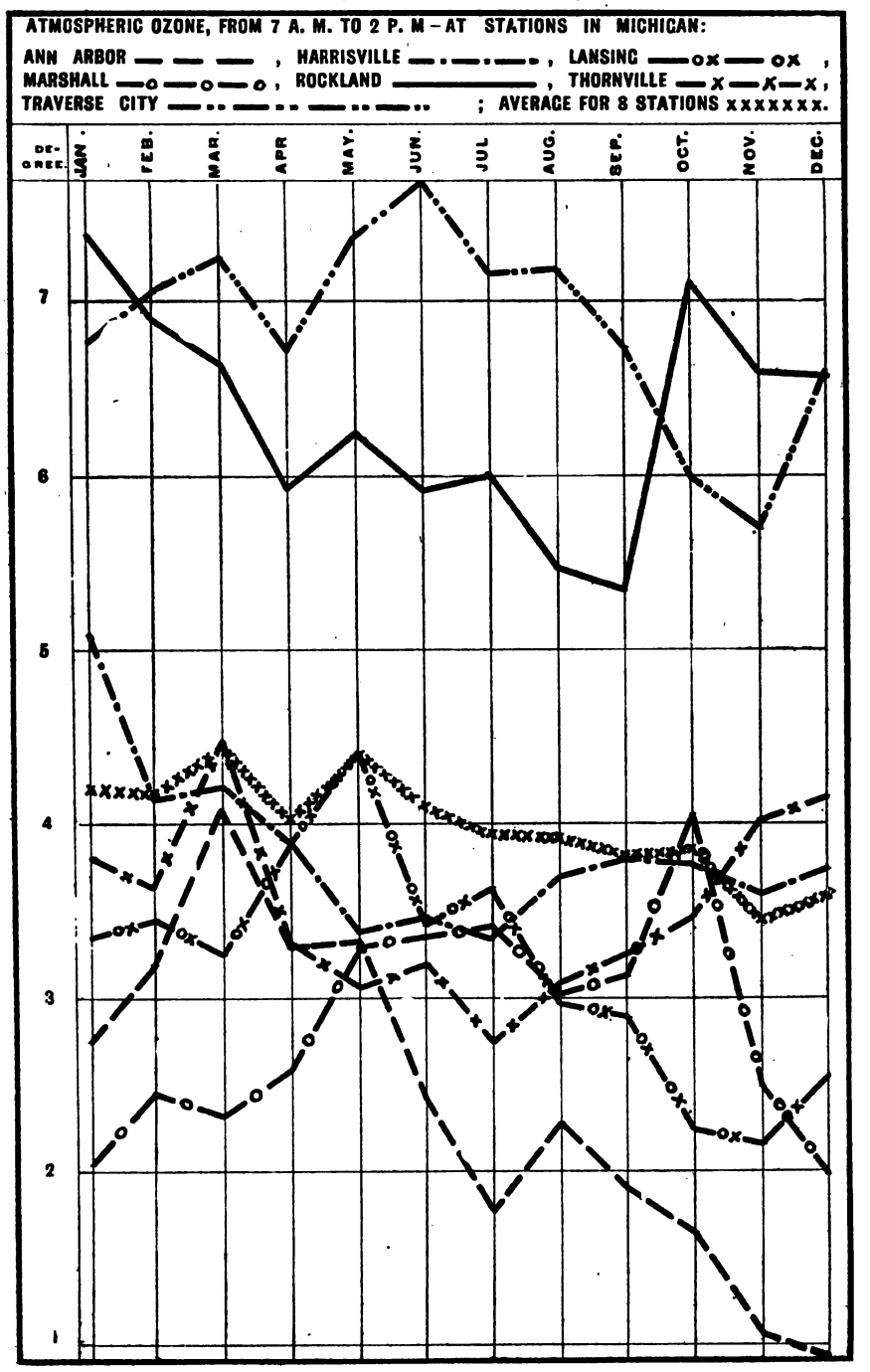


TABLE IX.—*Relative Amount of Ozone in the Atmosphere at Night, during the Year and during each Month of the Year 1891, at 11 Stations, also Average lines for 8 Stations and for 3 Stations in Michigan,—as indicated by Averages of Observations made Nightly by Exposing Test-paper, prepared according to Schönbein's formula, from 9 P. M. to 7 A. M.,—Recorded according to a scale of 10 Degrees of Coloration of the Test-paper (greatest coloration by Ozone equals 10), by Observers for the State Board of Health, and for the U. S. Signal Service.**

Stations in Michigan.† (Those of the U. S. Signal Service in Italics.)	Divisions of the State.‡	Degrees of Coloration of Test-paper.—Night Observation.**												
		Year.		Months, 1891.										
		Norm. §	1891.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 8 Stations‖	.....	.....	4.22	4.03	4.86	4.91	4.83	4.41	4.37	4.15	3.92	3.61	3.92	3.51	4.19
Av. for 3 Stations¶	.....	.....	2.90	3.06	3.21	3.44	3.20	2.98	3.49	3.16	3.30	3.15	1.80	1.42	2.60
Rockland	U. P.	.....	7.06	7.96	8.04 c	7.77	6.69	6.93 a	6.53	6.59 c	6.92 a	6.09 b	7.30 e	6.69 f	7.20 g
Marquette	U. P.	.....	††	4.41	.....	3.93	2.69	2.80	3.20	3.52	3.90	3.42	3.65	1.22	3.12
Manistee	N. W.	 10	‡‡	.....	.....	.....	.....	4.74	4.50	4.52	3.77	2.71	3.56	4.79	5.96
Traverse City	N. W.	4.30	6.33	6.05	7.33	7.22	6.86	6.45	7.63	6.90	5.00	5.65	5.46	5.26	6.12
Alpena	N. E.	 7	3.51	4.86	4.58	4.24	3.79	2.38	3.43	2.97	3.13	3.98	1.98	2.02	4.70
Harrisville	N. E.	4.94	4.44	5.09	5.15	4.57	4.93	3.32	3.93	4.16	4.80	4.42	4.53	3.92	4.47
Grand Haven	W.	.....	2.73	2.00	2.57	2.93	3.25	3.69	4.05	3.87	3.56	2.59	2.03	1.06	1.72
Port Huron	B. & E.	 15	2.41	2.31	2.47	3.15	2.56	2.71	3.00	2.65	3.22	2.88	1.40	1.19	1.89
Thornville	B. & E.	3.43 13	4.28	4.15	4.79	4.86	4.26	3.61	3.67	3.61	3.74	3.55	4.88	4.42	5.76
Lansing, S. B. of H.	C.	3.67	3.78	3.73	4.33	4.15	6.16	4.35	3.97	4.06	3.32	2.68	2.56	2.66	3.35
Otsego	S. W.	 2	§§	2.38	3.61	3.99	3.83 b	2 61	2.57	2.35	2.22 a	1.72	1.62	.....	.....
Albion	S. C.	3.23 12	3.10	2.05	3.54	4.51	3.20	3.51	3.07	2.77	2.56	2.62 c	2.82	2.66	3.47 d
Ann Arbor	S. C.	2.86	2.48	1.86	3.57	4.03	4.06	3.96	3.03	1.94	1.86	1.76 b	1.60	0.96	1.10
Battle Creek	S. C.	.....	1.37	0.99	1.43	1.57	1.56	1.96	1.70	1.81	1.71	1.47	0.78	1.12	0.28
Kalamazoo	S. C.	 11	‖‖	2.67	3.54	.....	.....	.....	.....	.....	.....	2.02	2.10	3.26	3.02
Marshall	S. C.	2.97	2.35	1.38	2.15	2.18	2.49	3.12	3.10	3.13	2.77	2.12	2.24	1.52 d	2.02 b
Birmingham	S. E.	.....	¶¶	3.57	4.36	3.77	3.59	3.90	4.53	3.42	.....	3.65	1.95	2.33	2.56

* At the U. S. Signal Service Stations and Kalamazoo during the year 1891, the observations were made by exposing the test-paper from 8 P. M. to 8 A. M., 75th meridian time. The corresponding local time for some of these stations is stated in a foot-note to Table II., page 24.

† The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit I, page 3.

‡ The full names of the divisions and the counties in each division are stated in Exhibit I., in a paper which follows on weekly reports of sickness.

§ Numbers in this column state the average annual relative amount of ozone by night for periods of years ending in each case with Dec. 31, 1891. The small figures above and at the right of the numbers which state the average, denote the number of years included in the average.

‖ This line is an average for only the stations from which statements, nearly complete, were received for every month in the year. It does not include Battle Creek, Otsego, Birmingham, Kalamazoo and the U. S. Signal Service Stations.

¶ This is an average line for Alpena, Grand Haven and Port Huron.

** Allowance has been made for difference in sensitiveness of test-paper in this table.

†† The average for 11 months is 3.26. ‡‡ For 8 months, 4.32. §§ For 10 months, 2.64. ‖‖ For 6 months, 2.60. ¶¶ For 11 months, 3.42.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

a For 30 days. b For 29 days. c For 27 days. d For 25 days. e For 21 days. f For 20 days. g For 16 days.

Eight lines in this table are graphically represented in Diagram IX., page 53.

DIAGRAM IX.-OZONE, AVERAGE BY NIGHT, MONTHS IN 1891.

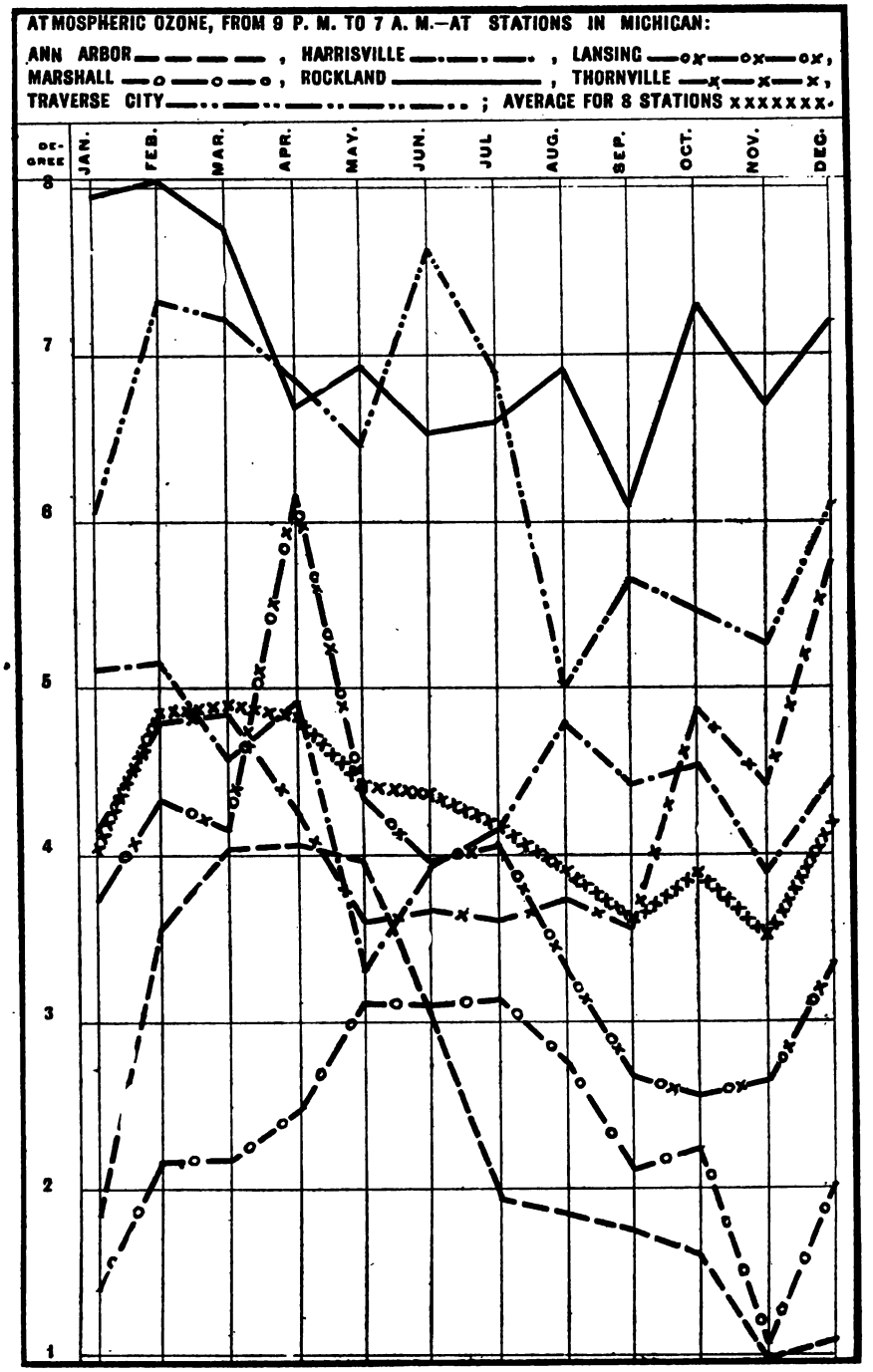


EXHIBIT 30.—*Average Amount of Atmospheric Ozone (Day), by Year and Months, in 1891, compared with Annual and Monthly Averages for 1890, and for the 14 years 1877-90. These Averages are for Groups of several Stations in Michigan.*

Years, etc.	Ozone by Day.—Degree of Coloration of Test-paper.†												
	Annual Av.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 14 years, 1877-90*..	3.29	3.47	3.57	3.61	3.47	3.49	3.29	2.88	3.10	3.05	3.04	3.10	3.39
1890 (8 stations).....	3.69	3.99	3.97	4.19	4.08	4.65	4.13	3.23	3.49	3.44	3.09	2.53	3 49
1891 (8 stations).....	3.99	4.20	4.18	4.46	4.02	4.40	4.10	3.94	3.92	3.82	3.85	3.45	3.59
In 1891 Greater than Av. for 14 years, 1877-90.....	.70	.73	.61	.85	.55	.91	.81	1.06	.82	.77	.81	.35	.20
In 1891 Less than Av. for 14 years, 1877-90.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
In 1891 Greater than in 1890.....	.30	.21	.21	.27	.....	.....	.....	.71	.43	.38	.76	.92	.10
In 1891 Less than in 1890.....	.....	.....	.....	.....	.06	.25	.03	.....	.....	.....	.....	.....	.....

* Mendon for 1877-83; Niles for 1878-81; Nirvana for 1877-79 and to and including April 25, 1880; Reed City for April 26 to end of year 1880 and for 1881-85; Coldwater, Agricultural College for 1877-78, 1880; Otisville for 1878-80; Washington for 1879-83; Petoskey, Woodmere Cemetery for 1878-79; Fife Lake, Ypsilanti for 1877; Ionia for 1880, 1883-84; Adrian for 1880; Mallory Lake for first seven months of 1881, Hudson for last five months of 1881; Hastings for 1882; Hillsdale for 1882-84; Parkville for 1882; Port Austin for 1883-85, 1888-89; Winfield for 1883; Manistique, Mackinaw City, Swartz Creek for 1884-85; Pentwater for 1886; Kalamazoo for 1877-88; Alpena for 1879-87; Marquette for 1880-81, 1883-84, 1886-87; Grand Haven for 1880-84; Escanaba for 1881-85, 1887; Port Huron for 1881-85; Battle Creek for 1877-90, 1882-84; Otsego for 1890; Tecumseh for 1877-85; Thornville for 1877-90; Lansing for 1879-90; Ann Arbor for 1880-90; Albion for 1890; Harrisville for 1881-82, 1885-90; Marshall for 1881-90; Traverse City for 1882-90; Birmingham for 1886-89.

† In this exhibit allowance has been made for difference in sensitiveness of different lots of test-paper.

EXHIBIT 31.—*Average Amount of Atmospheric Ozone (Night), by Year and Months, in 1891, compared with Annual and Monthly Averages for 1890, and for the 14 years, 1877-90. These Averages are for Groups of several Stations in Michigan.**

Years, etc.	Ozone by Night.—Degree of Coloration of Test-paper.†												
	Annual Av.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 14 years, 1877-90...	3.42	3.89	4.10	4.08	3.77	3.66	3.37	2.77	2.79	2.81	3.13	3.31	3.70
1890 (8 stations).....	3.83	3.91	4.57	4.49	4.47	4.33	4.19	3.39	3.51	3.14	3.09	2.63	3.71
1891 (8 stations).....	4.22	4.03	4.86	4.91	4.83	4.41	4.37	4.15	3.92	3.61	3.92	3.51	4.19
In 1891 Greater than Av. for 14 years, 1877-90.....	.80	.14	.76	.83	1.06	.75	1.00	1.38	1.13	.80	.79	.20	.49
In 1891 Less than Av. for 14 years, 1877-90.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
In 1891 Greater than in 1890.....	.39	.12	.29	.42	.36	.....	.18	.76	.41	.47	.83	.88	.48
In 1891 Less than in 1890.....	.....	.....	.....	.....	.....	.42	.....	.....	.....	.....	.....	.....	.....

* The stations represented in Exhibit 31, are the same as those represented in Exhibit 30, relative to day ozone, and named in foot-note of that exhibit.

† In this exhibit allowance has been made for difference in sensitiveness of different lots of test-paper.

OBSERVATIONS FOR OZONE AT LANSING.

Since July 1, 1884, the observations for ozone at Lansing have been taken at the new shelter for meterological instruments in the southwest part of the Capitol yard. Previous to July 1, 1884, the observations had been taken at the office window. Exhibit E, page 60, of the Report for 1885, shows that the average for the month of July, 1884, is greater at each observation—7 A. M. to 2 P. M., 2 P. M. to 9 P. M., and 9 P. M. to 7 A. M. at the shelter for instruments than at the office window. Possibly this fact should be taken into consideration in studying Ozone at Lansing through a long period of years.

EXHIBIT 32.—*Average Velocity of the Wind in Miles per hour, by Year and Months, in 1891, compared with Annual and Monthly Averages for 1890, and for the 9 years 1882-90. From Registers of the Robinson's Self-Registering Anemometer.* These Averages are for Groups of Several Stations in Michigan.*

Years, etc.	Average Miles per Hour.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 9 years, 1882-90	9.5	11.1	10.6	10.3	10.1	9.3	7.9	7.8	7.7	8.6	9.4	10.6	10.9
1890 (7 stations)	9.7	12.1	11.7	11.2	10.3	9.9	7.4	8.3	7.9	8.4	8.6	10.4	10.8
1891 (8 stations)	9.9	8.6	12.1	11.2	9.9	9.7	7.4	8.5	7.2	8.5	10.1	11.7	13.4
In 1891 Greater than Av. for 9 years, 1882-90	.4	.....	1.5	.9	.....	.4	.....	.7	.....	.....	.7	1.1	2.5
In 1891 Less than Av. for 9 years, 1882-90	.....	2.5	.....	.....	.2	.....	.5	.....	.5	.1	.....	.....	.....
In 1891 Greater than in 1890	.2	.....	.4	0	.....	.....	0	.2	.....	.1	1.5	1.3	2.6
In 1891 Less than in 1890	.....	3.5	.....	.....	.4	.2	.....	.....	.7	.....	.....	.....	.....

* Gibbon's Anemometer was used at Ann Arbor.

EXHIBIT 33.—*Average Velocity of the Wind in Miles per hour, by Months for the Years 1880-90, and comparisons of 1891 with this Average and with the Year 1890. From Registers of the Robinson's Self-Registering Anemometer in the Office of the State Board of Health, State Capitol, Lansing, Michigan.*

Years, etc.	Miles, by Self-Registering Anemometer.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 11 years, 1880-90	9.8	11.2	11.5	11.0	10.9	9.6	8.5	7.9	7.4	8.5	8.7	10.9	11.2
1890	9.4	12.2	11.7	10.4	8.3	10.6	8.0	7.6	7.5	7.7	8.4	10.3	10.6
1891	10.2	8.9	13.9	11.2	9.9	8.8	7.5	8.4	7.7	8.3	10.5	12.1	14.6
In 1891 Greater than Av. for 11 years, 1880-90	.4	.....	2.4	.2	.....	.....	.....	.5	.3	.....	1.8	1.2	3.4
In 1891 Less than Av. for 11 years, 1880-90	.....	2.3	.....	.....	1.0	.8	1.0	.....	.....	.2	.....	.....	.....
In 1891 Greater than in 1890	.8	.....	2.2	.8	1.6	.....	.....	.8	.2	.6	2.1	1.8	4.0
In 1891 Less than in 1890	.....	3.3	.....	.....	.....	1.8	.5	.....	.....	.....	.....	.....	.....

TABLE X.—*Average velocity of the Wind in Miles per Hour, for each Hour of the Day, by Months of the Year 1891. Compiled from Registers of the Robinson's Self-Registering Anemometer, exposed above the roof of the Capitol, and registering in the office of the State Board of Health, Lansing, Michigan.*

Months.	Average.			Hours (1891) and Average Miles per Hour.																							
				A. M.					P. M.													A. M.						
	Av. 12 years, 1880-91.	1890.	1891.	7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	5-6	6-7
Year	9.8	9.8	10.2	9.6	10.1	11.0	11.5	12.1	12.4	12.6	12.5	12.2	11.2	10.5	9.5	9.6	9.4	9.3	9.2	9.0	9.0	9.0	9.0	8.8	8.9	8.7	8.5
January	11.0	11.2	* 8.9	8.0	8.6	9.3	10.4	10.6	10.6	11.0	11.3	10.9	9.8	9.3	8.5	8.4	8.6	9.3	7.8	8.0	7.3	7.2	7.8	7.8	7.2	7.2	7.5
February	11.7	11.5	13.9	13.0	13.1	13.6	13.8	14.8	16.2	16.3	16.9	16.2	15.1	13.9	13.8	13.3	12.8	12.8	13.0	13.5	13.8	13.0	13.3	12.8	12.8	12.6	12.2
March	11.0	11.0	† 11.2	10.5	11.6	12.4	13.5	13.6	13.5	13.3	13.1	13.2	12.4	11.4	9.9	10.4	10.4	10.1	10.5	10.0	10.2	10.0	10.9	9.7	9.7	9.8	9.5
April	10.8	10.9	9.9	9.6	10.1	11.0	11.0	11.8	12.4	12.0	12.7	12.3	11.5	10.3	9.0	9.0	8.8	8.9	8.9	8.4	8.4	8.2	8.3	8.6	8.8	8.4	8.6
May	9.5	9.6	† 8.8	8.3	8.7	10.1	10.5	10.7	11.4	11.2	11.7	11.7	10.9	10.1	7.7	7.6	7.4	7.5	7.3	7.6	7.6	7.3	7.5	7.5	7.2	7.0	7.2
June	8.4	8.5	7.5	6.3	6.9	8.2	8.8	9.6	9.5	10.4	10.0	9.9	10.1	9.3	8.0	7.1	7.3	6.7	6.5	6.2	5.9	5.6	5.5	5.5	5.8	5.7	5.4
July	8.0	7.9	† 8.4	8.1	9.3	9.9	10.1	10.7	11.3	11.0	12.3	12.5	11.0	10.3	8.4	6.9	6.5	7.1	6.5	6.1	6.6	6.7	5.6	5.8	6.4	6.2	6.1
August	7.5	7.4	† 7.7	7.3	7.4	8.5	9.1	9.1	9.1	9.5	9.2	9.5	9.0	9.0	7.8	7.5	7.0	6.5	6.1	6.1	6.1	6.3	7.0	7.1	6.9	6.6	6.4
September	8.5	8.5	8.3	8.5	8.8	9.2	9.8	10.5	11.1	11.2	10.6	9.9	8.9	7.4	6.5	7.7	7.8	7.4	7.1	7.0	6.9	7.7	6.7	7.2	7.5	7.5	7.0
October	8.8	8.7	10.5	8.8	9.6	10.6	11.7	12.4	12.3	13.7	13.7	13.5	11.3	10.3	10.1	11.2	10.9	10.3	10.2	9.5	9.3	9.8	9.4	9.0	9.0	8.4	8.0
November	11.0	10.9	12.1	12.4	12.6	13.9	14.0	14.5	14.8	15.0	13.9	12.6	11.2	10.9	10.7	11.4	11.5	11.4	12.1	11.3	11.0	11.2	10.7	10.6	11.1	11.2	10.9
December	11.5	11.2	14.6	14.3	14.2	15.1	15.8	16.4	16.6	16.6	15.1	14.1	13.6	13.9	13.6	14.4	14.0	14.1	14.7	14.2	14.3	14.6	14.7	14.0	13.9	13.7	13.6

* For only about 29 days. † For only about 30 days.

The statements in the third figure column in Table X. of the average velocity of the wind in miles per hour, by months, during the year 1891, are graphically represented in Diagram XI., page 58. The remaining columns of Table X. for 1891, are graphically represented in Diagram X., page 57.

DIAGRAM X.—VELOCITY OF WIND, BY HOURS AND MONTHS. 1891.

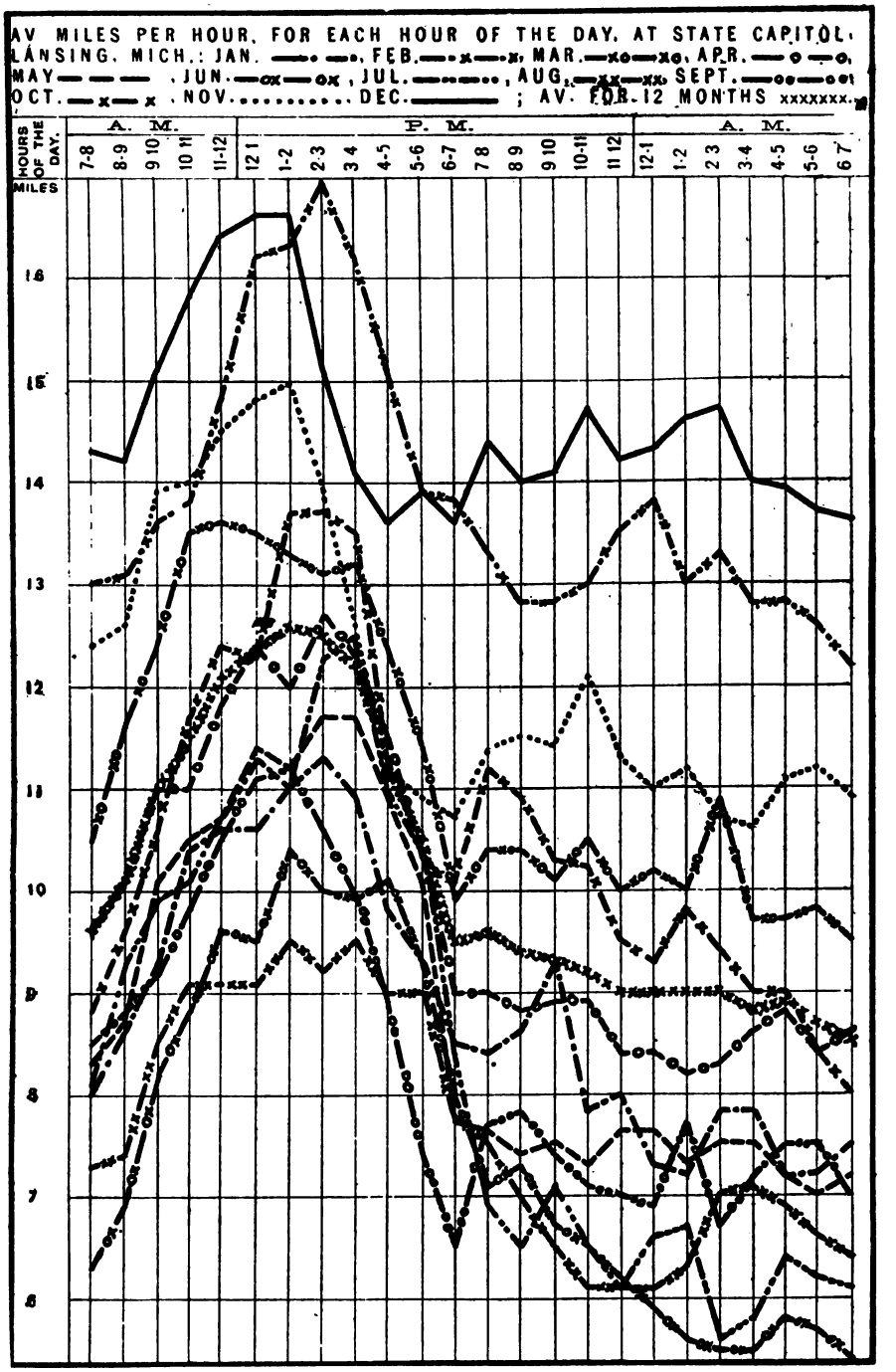


DIAGRAM XI.—VELOCITY OF WIND, BY MONTHS IN 1891.

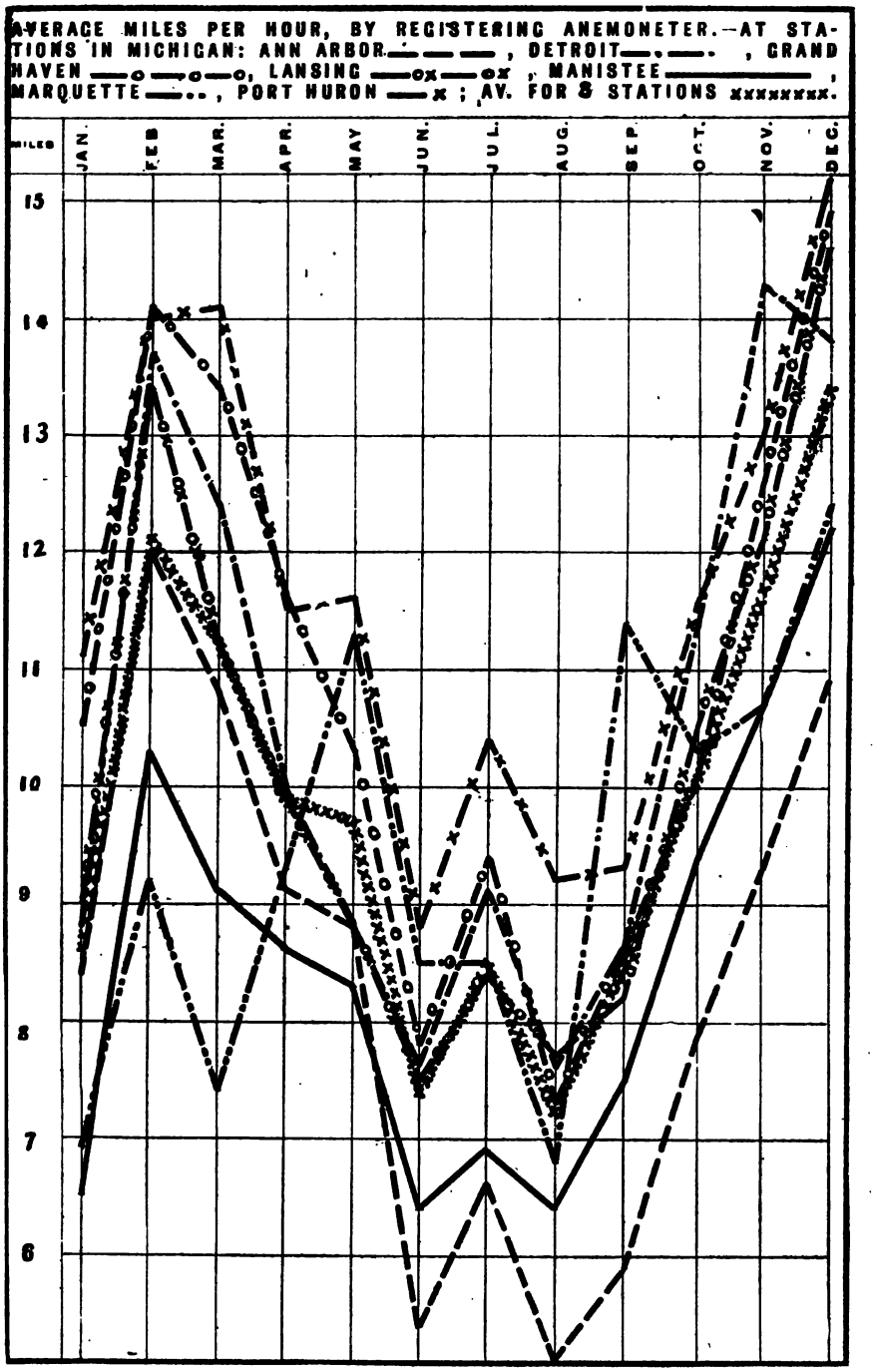


TABLE XI.—*Average Velocity of the Wind in Miles per Hour for the Year and for each Month of the Year 1891, at 8 Stations in Michigan. Computed from Registers of the Robinson's Self-Registering Anemometer,* by Observers for the State Board of Health, and for the U. S. Signal Service.*

Stations in Michigan.†	Division of the State.	Miles, by Self-Registering Anemometer.												
		Year.		Months, 1891.										
		Norm. ‡	1891.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 8 stations¶	.....	.....	9.9	8.6	12.1	11.2	9.9	9.7	7.4	8.5	7.2	8.5	10.1	11.7	13.4
Marquette	U. P.	9.0^{6}	9.4	6.9	9.2	7.4	9.3	11.3	8.5	8.5	6.8	11.4	10.3	10.7	12.4
Sault Ste. Marie	U. P.	.....	§	.....	.....	.....	.....	.....	7.3	8.0	6.3	8.0	8.4	8.5	11.6
Manistee	N. W.	8.3^{3}	8.5	6.5	10.3	9.1	8.6	8.3	6.4	6.9	6.4	7.5	9.4	10.7	12.2
Alpena	N. E.	.....	9.5	7.7	10.4	11.2	9.5	9.6	7.1	8.7	7.1	8.3	9.8	11.0	13.0
Grand Haven	W.	11.0^{2}	10.9	10.5	14.1	13.4	11.6	10 3	7.8	9.4	7.3	8.6	10.1	12.6	14.9
Port Huron	B. & E.	10.3^{10}	11.7	11.1	14.0	14.1	11.5	11.6	8.8	10.4	9.2	9.3	11.6	13.0	15.2
Lansing, S. B. of H.	C.	9.8^{12}	10.1	9.0	13.4	11.2	9.9	8.8	7.5	8.4	7.7	8.2	10.5	12.1	14.6
Ann Arbor	S. C.	8.9^{10}	8.4	8.4	12.0	10.8	9.1	8.8	5.4	6.6	5.1	5.9	7.9	9.3	10.9
Detroit	S. E.	9.6^{10}	10.5	8.8	13.7	12.4	10.0	8.8	7.6	9.1	7.6	8.6	11.4	14.3	13.8

* Gibbon's Anemometer was used at Ann Arbor.
† The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit 1, page 3.
‡ Numbers in this column state the average velocity of the wind in miles per hour for periods of years ending in each case with Dec. 31, 1891. The small figures above and at the right of numbers which state the average, denote the number of years included in the average.
§ The average for 7 months is 8.3.
¶ Not including Sault Ste. Marie.

Graphic representations of statements made in Table XI., are given in Diagram XI., page 58.

The construction and purport of the diagrams relating to direction of wind may be explained as follows:—

In Diagrams XII., XIII., XIV. and XV., pages 63, 60, 61 and 62, relating to the directionof the wind, the single figures or separate groups of lines are designed to indicate by the length of the lines the number and the proportion of regular observations at 7 A. M., 2 P. M. and 9 P. M. daily, at which the wind was blowing from each of the eight principal points of compass at the places and for the periods of time stated in the margin; and by the direction of the lines on the page, the direction of the wind. Each figure consists of lines drawn to a common center from some or all of the following directions on the page and indicating that at the times of observation the wind blew from points of the compass as follows: Lines toward the common center from the top of the page indicate observations that the wind was blowing from the north; from the right-hand side, observations that the wind was from the east; from the bottom of the page, that it was from the south; from the left-hand side, that it was from the west; from the upper left-hand corner, that it was from the northwest; from the upper right-hand corner, that it was from the northeast; from the lower right-hand corner, that it was from the southeast; and from the lower left-hand corner, that it was from the southwest. The number of regular observations at which the wind was blowing from the direction denoted by a line is indicated by the length of that line, .01 of an inch being the unit or the length of line for one observation. The circles indicate calms, the number of regular observations at which there was no wind being denoted by the length of the *radius* of the circle drawn about the point of convergence of the lines for a given place or period of time, the length of one observation being, as before, .01 of an inch. Thus, by Diagram XII., page 63, or by Table XIV., pages 64–67 it appears that at Albion in April, 1891, at one of the regular tri-daily observations for the month there was a calm; at 9 observations the wind was blowing from the west, at 3 observations from the northwest; at 10 from the northeast, etc. For convenient study the top of these diagrams should be held toward the north. Definite numerical statements corresponding to these diagrams are given in Tables XII., XIII., and XIV., and Exhibit 34, pages 61, 62, 64–67, 60.

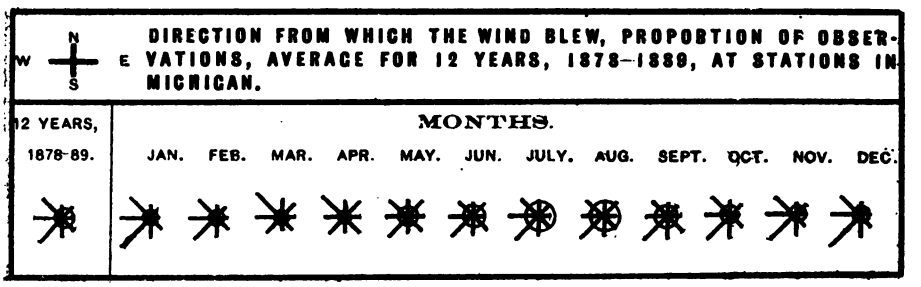
EXHIBIT 34.—DIRECTION OF WIND, 1878-89.—*Number of Observations per Month (made tri-daily), at which the Wind was blowing from the several (eight) points of Compass.—Annual and Monthly Averages for the 12 Years, 1878-89, at Stations in Michigan.**

Points of Compass.	Average Number of Observations per Month—12 Years, 1878-89.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
All observations ...	91	93	85	93	90	93	90	93	93	89	92	90	93
Calm	5	4	4	4	4	5	6	8	8	6	5	4	4
North	7	6	6	10	9	8	7	8	8	6	8	6	6
Northeast	8	6	7	10	11	11	9	8	10	7	8	7	5
East	6	5	6	7	8	8	6	5	6	6	5	5	5
Southeast	9	9	9	9	11	11	10	8	9	11	9	7	8
South	10	11	10	7	8	10	11	10	10	12	12	11	11
Southwest.....	17	22	16	12	12	15	16	18	17	18	18	19	23
West	14	16	14	14	11	12	13	16	12	12	13	17	17
Northwest.....	14	15	13	19	16	13	11	13	13	12	14	15	14

* At 12 stations in 1878; 16 in 1879; 19 in 1880; 19 in 1881; 21 in 1882; 19 in 1883; 21 in 1884; 21 in 1885; 16 in 1886; 17 in 1887; 13 in 1888, and 11 in 1889.

Graphic representations of statements made in Exhibit 34 are given in Diagram XIII., page 60.

DIAGRAM XIII.—WIND, DIRECTION, IN MICH., AVERAGE 12 YEARS, 1878–1889.



*SCALE, RADIUS .01 OF ONE INCH TO ONE OBSERVATION

TABLE XII.—*Number of Observations per Month (at 7 A. M., 2 P. M. and 9 P. M., daily), at which the Wind was blowing from each of the Eight Principal Points of Compass, during the Year and during each Month of the Year 1891. Average for 11 Stations in Michigan.**

Points of Compass.	Average Number of Observations per Month, 1891.												
	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
All observations (11 Stations)	89	92	82	93	89	92	87	92	92	88	88	86	90
Calm	4	3	1	3	4	4	6	7	9	7	3	2	2
North	8	11	4	9	11	14	4	9	11	8	9	7	2
Northeast	8	9	7	16	6	14	12	7	11	5	6	4	2
East	7	6	4	17	7	7	16	5	6	3	4	1	4
Southeast	8	9	8	12	10	7	13	6	7	8	6	7	8
South	11	11	12	8	8	6	8	8	8	12	12	15	18
Southwest	20	19	18	11	17	17	16	19	18	24	22	21	32
West	12	12	16	9	15	11	7	16	9	9	10	16	14
Northwest	11	12	12	8	11	12	5	15	13	12	16	13	8

* The names of observers, their places of observation, and the counties and divisions of the State in which those places are situated are stated in Exhibit 1, page 3.

Graphic representations of statements in Table XII. are given in Diagram XIV., on page 61.

DIAGRAM XIV—WIND, DIRECTION; IN MICH., YEAR AND MONTHS, 1891.

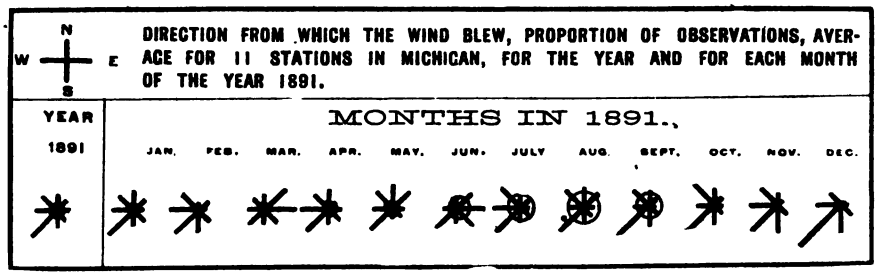


TABLE XIII.—*Average Number of Observations per Month for the Year 1891, at which the Wind was Blowing from each of the Eight Principal Points of the Compass, at each of 12 Stations* in Michigan; also the Average lines for 11 of these Stations.*

Stations in Michigan.*	Divisions of the State.†	Average Number of Observations Per Month, 1890.									
		All Obs.	Calms	N.	N. E.	E.	S. E.	S.	S. W.	W.	N. W.
Av. for 11 stations	.....	90	4	8	8	7	8	11	20	12	12
Rockland	U. P.	84	8	18	2	11	9	17	4	7	7
Gulliver Lake ¶	U. P.	92	11	14	5	6	9	15	14	5	13
Traverse City	N. W.	91	10	16	5	1	5	13	29	6	7
Harrisville	N. E.	91	0	0	9	1	17	2	38	1	23
Thornville	B. & E.	91	0	0	15	8	19	1	18	15	15
Agricultural College	C.	91	12	9	10	7	5	6	21	14	8
Lansing S. B. of H.	C.	91	0	8	10	6	8	14	17	16	13
Albion	S. C.	91	5	6	12	8	5	10	29	9	7
Ann Arbor	S. C.	91	2	12	7	9	6	13	12	17	13
Battle Creek	S. C.	91	0	6	5	9	8	16	15	18	14
Marshall	S. C.	91	0	7	10	9	5	12	20	18	10
Birmingham	S. E.	85	10	9	7	5	6	13	12	12	11

* The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit 1, page 3.

† The full names of the divisions and counties in each division, are stated in Exhibit I, in a paper which follows on weekly reports of sickness.

¶ The line for Gulliver Lake is not included in "Av. for 11 Stations." The registers were received too late.

DIAGRAM XV—WIND, DIRECTION, AT STATIONS IN MICHIGAN, 1891.

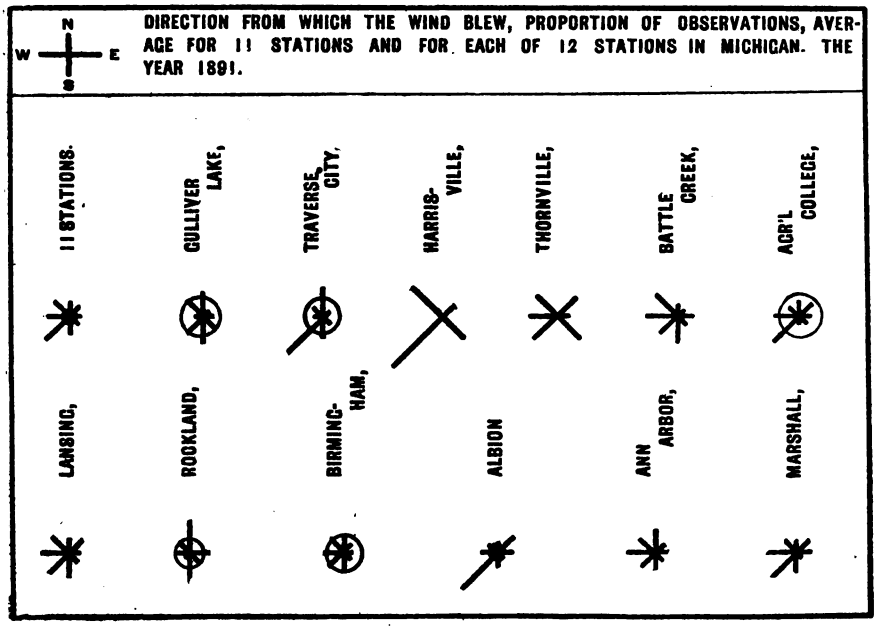


DIAGRAM XII.—WIND, DIRECTION, AT STATIONS, BY MONTHS, 1891.

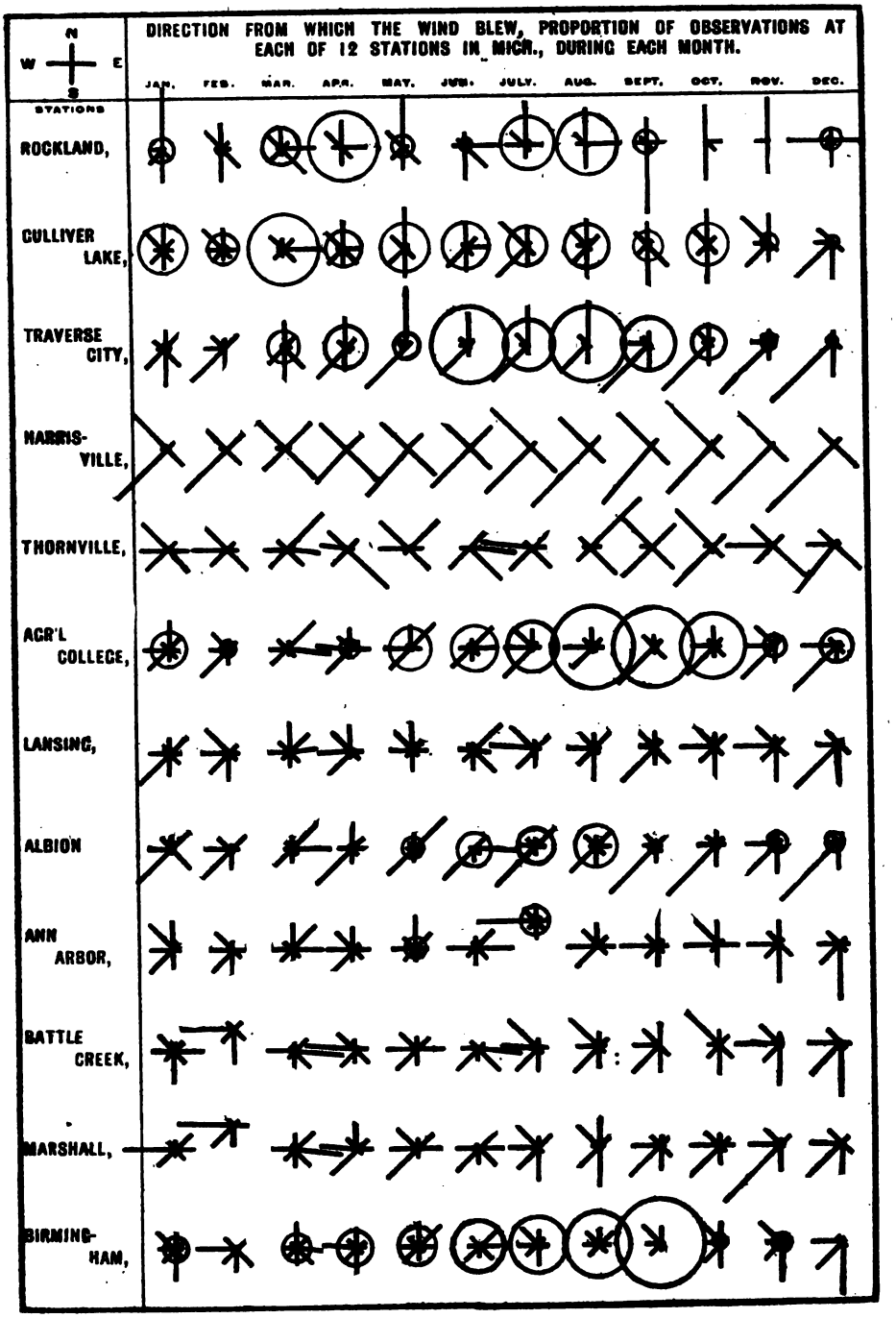


TABLE XIV.—*Number of Observations for each Month of the Year 1891, at which the wind was blowing from each of the Eight Principal Points of the Compass, at each of the 12 Stations* in Michigan; also the Average Lines for 11 of the said Stations from which nearly Complete Observations were received for the Year.* (*Observations were made at 7 A. M., 2 P. M. and 9 P. M., Daily.*)

Stations in Michigan.	Divisions of the State.*	January.										February.										March.									
		Total.	Calm.	N.	N.E.	E.	S.E.		.W.	W.	N.W.	Total.	Calm.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Total.	Calm.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.
Av. 11 Stations†	.....	93	3	11	9	6	9	11	19	12	12	84	1	4	7	4	8	12	18	16	12	93	3	9	16	17	12	8	11	9	8
Rockland	U. P.	91	7	35	2	2	8	19	11	5	2	83	3	14	6	5	15	19	3	4	14	93	11	11	5	20	20	4	8	3	11
Gulliver Lake ‡.	U. P.	93	14	14	8	5	8	11	11	6	16	84	9	13	3	9	7	6	10	10	17	93	20	6	8	22	10	5	8	3	11
Traverse City....	N. W.	93	3	12	13	1	13	22	15	6	8	84	2	6	11	1	2	13	27	12	10	93	9	16	10	4	15	19	13	3	4
Harrisville.....	N. E.	93	0	0	5	0	12	2	44	2	28	84	0	1	13	0	13	3	34	4	16	93	0	0	21	3	24	1	17	5	22
Thornville	B. & E.	93	2	0	7	12	17	0	17	17	21	84	0	0	7	6	17	3	13	20	18	93	0	0	29	17	13	0	14	13	7
Agr'l College.....	C.	93	10	17	10	6	7	6	16	15	6	84	5	6	7	5	4	10	23	11	13	93	1	5	22	24	6	4	12	11	8
Lansing, S. B. of H.	C.	93	0	10	13	6	8	13	25	12	6	84	0	0	6	5	6	16	16	16	19	93	0	17	15	16	8	9	7	13	8
Otsego	S. W.	93	10	3	3	14	8	5	17	18	15	84	2	0	10	7	16	15	3	26	11	93	2	6	14	28	10	6	5	17	5
Albion	S. C.	93	2	8	14	2	13	4	28	13	9	84	0	3	11	5	3	12	24	16	10	93	1	7	23	22	5	9	15	5	6
Ann Arbor.....	S. C.	93	1	16	5	5	1	12	19	13	20	84	1	5	0	7	7	16	18	15	14	93	0	15	19	16	7	7	10	12	7
Battle Creek	S. C.	93	1	5	7	17	10	19	8	13	13	84	0	1	7	2	9	20	10	29	6	93	0	5	10	27	13	11	6	17	4
Marshall	S. C.	93	0	6	13	11	6	5	14	30	8	84	0	2	5	10	1	12	17	31	6	93	0	10	15	27	7	11	7	13	3
Birmingham	S. E.	91	7	12	8	4	5	18	11	10	16	83	2	2	8	2	13	13	11	23	9	90	8	15	8	15	13	10	7	9	5

Diagram XII., page 63, gives 12 lines in this table, and is explained on page 59.

* For names of observers, etc., see Exhibit 1, page 3. For names of divisions, etc., see Exhibit I., in a paper which follows on weekly reports of sickness.

† This line includes only the 11 stations, at which observations were made tri-daily, and from which statements complete, or nearly complete, were received for every month of the year; it does not include Otsego.

‡ The line for Gulliver Lake is not included in "Av. for 11 Stations." The registers were received too late.

TABLE XIV.—CONTINUED.—*Direction of Wind, Months in 1891.—Observations at which the Wind was blowing from Direction named.*

Stations in Michigan.*	Divisions of the State.*	April.										May.										June.									
		Total.	Calm.	N.	N. E.	E.	S. E.	S.	S. W.	W.	N. W.	Total.	Calm.	N.	N. E.	E.	S. E.	S.	S. W.	W.	N. W.	Total.	Calm.	N.	N. E.	E.	S. E.	S.	S. W.	W.	N. W.
Av. 11 Stations†	.....	90	4	11	6	7	10	8	17	15	11	92	4	14	14	7	7	6	17	11	12	89	6	4	12	16	13	8	16	7	5
Rockland	U. P.	90	20	15	2	14	8	11	2	6	12	87	6	29	1	3	13	13	10	0	12	90	4	7	4	20	18	21	4	7	5
Gulliver Lake‡	U. P.	90	10	16	2	9	12	11	13	4	13	93	14	23	3	3	8	17	14	1	10	90	13	15	8	13	6	14	16	1	4
Traverse City	N. W.	90	12	19	8	3	3	13	24	2	6	96	8	34	4	0	2	1	33	3	8	90	21	19	5	2	3	7	22	5	6
Harrisville	N. E.	90	0	1	12	1	25	3	27	1	20	93	0	0	11	0	22	2	36	1	21	90	0	0	18	1	18	1	31	0	21
Thornville	B. & E.	90	0	0	8	3	32	0	14	17	16	93	0	2	23	8	16	0	5	17	22	90	0	0	15	26	26	1	16	6	0
Agr'l College	C.	90	5	12	7	12	2	5	19	19	9	93	12	18	19	6	2	2	18	17	4	90	13	5	16	14	6	5	16	8	4
Lansing, S. B. of H.	C.	90	0	15	2	8	7	5	19	19	15	93	0	15	16	8	5	13	7	14	15	90	1	4	21	10	18	12	9	10	5
Otsego	S. W.	90	6	4	7	11	6	3	2	35	16	93	8	3	11	13	4	7	7	23	17	90	7	0	3	32	15	7	8	9	9
Albion	S. C.	90	1	15	10	9	6	9	28	9	3	93	6	12	25	6	5	8	21	5	5	90	10	1	9	26	6	9	26	3	0
Ann Arbor	S. C.	90	0	12	4	10	8	8	18	16	14	93	6	19	13	8	7	8	10	13	9	90	2	7	13	22	10	10	8	14	4
Battle Creek	S. C.	90	0	5	2	7	11	9	13	29	14	93	0	7	10	16	1	10	17	18	14	90	1	2	5	25	18	7	17	9	6
Marshall	S. C.	90	0	14	9	10	5	3	20	21	8	93	0	5	12	14	0	6	24	16	16	90	0	3	14	15	14	10	18	13	3
Birmingham	S. E.	88	10	11	5	4	4	17	9	21	7	91	11	14	17	8	4	8	10	12	7	83	15	0	15	11	9	6	12	7	8

* † ‡ For these references see foot-notes to this table on page 64.

NOTE.—Graphic representations of statements for 12 lines in this table are given in Diagram XII., page 63, which is explained on page 59.

TABLE XIV.—CONTINUED.—*Direction of Wind, Months in 1891.—Observations at which the Wind was blowing from Directions named.*

Stations in Michigan.*	Division of the State.*	July.										August.										September.									
		Total.	Calm.	N.	N. E.	E.	S. E.	S.	S. W.	W.	N. W.	Total.	Calm.	N.	N. E.	E.	S. E.	S.	S. W.	W.	N. W.	Total.	Calm.	N.	N. E.	E.	S. E.	S.	S. W.	W.	N. W.
Av. 11 Stations†	.....	92	7	9	7	5	6	8	19	16	15	91	9	11	11	6	7	8	18	9	13	89	7	8	5	3	8	12	24	9	12
Rockland	U. P.	89	15	24	3	10	4	8	2	12	11	88	17	20	0	20	1	14	1	3	9	90	7	14	0	12	5	40	2	6	4
Gulliver Lake‡	U. P.	93	11	11	4	2	6	12	24	2	21	93	13	15	9	3	4	19	13	6	11	90	9	13	4	3	17	25	8	1	10
Traverse City	N. W.	93	14	28	1	0	0	6	29	5	10	93	21	24	2	1	3	11	21	3	7	90	15	8	0	0	2	13	37	11	4
Harrisville	N. E.	93	0	0	4	1	20	1	36	0	31	93	0	0	8	0	12	1	47	2	23	90	0	0	6	0	14	1	43	0	26
Thornville	B. & E.	93	0	0	14	11	17	0	18	28	5	93	0	0	39	7	22	0	11	5	9	90	0	0	17	0	18	1	24	7	23
Agr'l College	C.	93	14	10	4	5	3	3	24	16	14	93	23	11	7	6	3	3	16	17	7	90	22	7	6	3	9	4	29	1	9
Lansing, S. B. of H.	C.	93	0	5	11	4	2	12	15	25	19	93	2	9	13	4	4	19	14	16	12	90	2	9	6	2	12	10	27	9	13
Otsego	S. W.	93	9	4	6	8	6	5	7	24	24	93	15	2	9	8	4	7	7	20	21	90	14	3	6	11	10	5	8	16	17
Albion	S. C.	93	10	5	16	6	2	5	32	10	7	93	12	6	13	9	7	11	21	5	9	90	4	1	9	3	5	10	38	8	12
Ann Arbor	S. C.	93	8	10	2	6	7	11	6	33	10	93	1	13	9	10	8	3	17	17	13	90	0	20	5	7	5	12	10	21	10
Battle Creek	S. C.	93	0	6	2	6	4	14	18	20	23	93	1	8	7	4	5	12	20	13	23	90	0	13	1	1	8	17	21	15	14
Marshall	S. C.	93	0	7	11	0	4	19	17	17	18	93	0	17	8	3	3	22	18	5	17	90	0	6	7	3	9	15	25	17	8
Birmingham	S. E.	87	16	9	6	5	3	12	10	12	14	79	19	9	10	6	5	6	9	10	11	78	25	10	0	1	5	5	9	9	14

* † ‡ For these references see foot-notes to this table on page 64.

NOTE.—Graphic representations of statements for 12 lines in this table are given in Diagram XII., page 63, which is explained on page 59.

TABLE XIV.—CONCLUDED.—*Direction of Wind, Months in 1891.-Observations at which the Wind was blowing from Directions named.*

Stations in Michigan.	Divisions of the State.*	October.										November.										December.									
		Total.	Calm.	N.	N. E.	E.	S. E.	S.	S. W.	W.	N. W.	Total.	Calm.	N.	N. E.	E.	S. E.	S.	S. W.	W.	N. W.	Total.	Calm.	N.	N. E.	E.	S. E.	S.	S. W.	W.	N. W.
Av. 11 Stations†	.....	89	3	9	6	4	6	12	22	10	16	87	2	7	4	1	7	15	21	16	13	91	2	2	2	4	8	18	32	14	8
Rockland	U. P.	65	1	21	1	9	7	22	0	2	2	58	2	24	0	1	1	19	2	7	2	79	6	6	0	17	4	15	4	24	3
Gulliver Lake	U. P.	93	12	20	6	1	8	24	8	2	12	90	5	17	1	1	6	11	19	9	21	93	4	4	1	3	8	23	29	10	11
Traverse City	N. W.	93	10	11	4	0	3	14	38	4	9	90	5	7	6	0	4	10	40	11	7	93	3	7	0	1	6	21	49	4	2
Harrisville	N. E.	93	0	0	9	0	11	1	37	0	35	90	0	0	2	0	13	3	46	2	24	93	0	0	4	0	19	3	54	0	13
Thornville	B. & E.	93	0	1	9	3	9	4	33	5	29	90	0	0	8	1	25	0	14	26	16	93	0	0	2	3	20	2	38	16	12
Agr'l College	C.	93	18	10	6	3	8	6	23	14	5	90	6	6	7	1	2	10	26	17	15	93	9	2	3	3	6	9	35	20	6
Lansing, S. B. of H.	C.	93	0	8	9	2	7	19	12	20	16	90	0	5	6	0	8	20	12	24	15	93	0	0	3	1	8	23	35	12	11
Otsego	S. W.	93	3	4	5	12	10	11	10	19	19	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Albion	S. C.	93	1	9	6	4	3	13	39	11	7	90	6	9	4	1	4	16	26	19	5	93	6	0	3	2	3	15	46	9	9
Ann Arbor	S. C.	93	1	14	5	12	1	14	6	19	21	90	0	14	4	0	9	23	11	19	10	92	1	2	5	6	6	32	16	14	10
Battle Creek	S. C.	93	0	9	9	2	11	17	10	7	28	90	0	6	2	0	4	24	13	25	16	93	0	3	0	6	4	29	23	18	10
Marshall	S. C.	93	0	7	7	8	5	11	25	18	12	90	0	4	8	2	3	15	26	19	13	93	0	0	5	1	8	20	29	19	11
Birmingham	S. E.	78	5	12	5	0	3	15	15	7	16	84	5	5	1	4	5	23	14	10	17	88	2	3	2	3	3	31	22	18	4

* † ‡ For these references see foot-note to this table on page 64.

NOTE.—Diagram XII., page 63, exhibits lines showing, by months, directions of wind at each of 12 stations in this table; for each month and station, the diagram represents the figures given in this table for the same month and station; it is explained on page 59.

TABLE XV.—*Average Daily Range of Atmospheric Pressure (as determined from three daily observations) for the Year and for each month of the Year 1891, at each of 11 Stations, and the average lines for 10 Stations* in Michigan—Stations arranged in order by Latitude, those farthest North first.*

Stations in Michigan.*	Average Daily Range of Barometer—Year and Months, 1891.													
	Norm. †	1890.	1891.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 10 Stations‡	.....	.....	.202	.241	.337	.259	.192	.130	.120	.132	.123	.148	.200	.266	.277
Rockland	.....	.....	.231	.232	.303	.264[b]	.245	.185[e]	.175	.151[g]	.155[e]	.185[b]	.291[h]	.245[i]	.345[g]
Gulliver Lake	.216[4]	.239	.208	.227	.335	.249	.208	.148	.110	.110	.116	.171	.214	.295	.312
Traverse City	.217[10]	.231	.200	.227	.326	.264	.191	.141	.115	.120	.107	.157	.196	.276	.282
Harrisville	.231[7]	.248	.216	.244	.366	.268	.202	.143	.130	.140	.133	.178	.215	.279	.294
Thornville	.215[8]	.264	.210	.250	.343	.265	.181	.120	.123	.146	.142	.156	.213	.298	.286
Agr'l College	.203[9]	.224	.196	.262	.343	.246	.194	.130	.110	.123	.127	.133	.188	.279	.226
Lansing, S. B. of H.	.205[10]	.230	.192	.234	.330	.256	.182	.130	.105	.125	.110	.133[f]	.185[a]	.253	.257[b]
Birmingham	.208[5]	.232	.197	.249	.364[c]	.257	.189[b]	.104	.103[b]	.131	.114[b]	.135	.182	.264	.271
Otsego	.....	.....	¶	.263[g]	.321	.245	.188	.120	.103	.120	.105	.129	.172	.....	.....
Battle Creek	.....	.....	§	.263	.328	.257	.184	.117	.108	.122	.108	.142	.176	.284[e]	.....
Ann Arbor	.206[10]	.227	.197	.241	.335	.257	.183	.103	.114	.128	.117	.143	.173	.259	.307[a]
Marshall	.204[9]	.223	.189	.234	.328	.254	.171	.117	.118	.118	.122	.132	.178	.246	.255
Albion	.210[2]	.228	.191	.236	.331	.255	.180	.124	.106	.134	.107	.125	.181	.260	.250
Tecumseh	.....	.222	‖	.247	.331	.260	.176	.115	.111	.142	.109	.....	.....	.256	.250

* The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit 1, page 3. The average atmospheric pressure at each of these stations, by months in 1891, is given in table XVII., page 73.

† Numbers in this column state the average daily range of atmospheric pressure for periods of years ending in each case with Dec. 31, 1891. The small figures above and at the right of numbers which state the average daily range, denote the number of years included in the average.

‡ Not including Otsego, Battle Creek, Tecumseh and Gulliver Lake. The line for Gulliver Lake is not included in "Av. for 10 Stations;" the registers were received too late.

¶ The average for 10 months is .177. § For 11 months, .190. ‖ For 10 months, .200.

a For 30 days. b For 29 days. c For 28 days. d For 27 days. e For 26 days. f For 25 days. g For 23 days. h For 18 days. i For 15 days.

NOTE.—The latitude and elevations of some of the stations are stated in Exhibit 2, page 4.

The daily range is found by subtracting the lowest observation from the highest observation, 7 A. M. to 7 A. M.

TABLE XVI.—*Range of Atmospheric Pressure (as determined from 3 Daily Observations) for the Year and for each Month and for the Average Month of the Year 1891, at 10 and at each of the 10 Stations, and Average Line for 10 Stations in Michigan; also the Norm.—Average Monthly Range for a series of years. Stations named in order by Latitude, those farthest North first.*

Stations in Michigan.	Range of Barometer.—Year and Months, 1891.														
	Norm. †	1890.	1891.	Av. Month	Jan.	Feb.	Mar	Apr.	May.	June	July.	Aug.	Sept.	Oct,	Nov.	Dec.
For 10 stations‡	------	------	1.397	1.288	1.397	1.598	1.403	1.096	.878	1.070	1.077	.940	.970	1.283	1.763	1.486
Av. for 10 Stations¶	------	------	1.462	.866	1.420	1.209	1.014	.677	.489	.634	.543	.581	.592	.802	1.263	1.171
Rockland	------	*	------	§	1.286	1.369	a 1.144	.853	d .847	.757	d .574	c .594	b .804	g .901	-----	-----
Gulliver Lake	.961 4	1.408	1.600	.928	1.267	1.377	1.106	.803	.661	.652	.495	.608	.670	.934	1.178	1.387
Traverse City	.964 10	1.351	1.464	.896	1.291	1.245	1.061	.739	.638	.656	.558	.538	.660	.861	1.247	1.263
Harrisville	.986 7	1.404	1.452	.935	1.354	1.298	.958	.883	.563	.614	.770	.602	.719	.965	1.270	1.222
Thornville	.950 8	1.406	1.452	.898	1.384	1.270	1.031	.687	.458	.658	.621	.718	.631	.845	1.327	1.144
Agr'l College	.912 9	1.462	1.489	.863	1.489	1.208	1.031	.615	.491	.625	.485	.632	.582	.809	1.205	1.185
Lansing, S. B. of H.	.910 10	1.395	1.451	.841	1.454	1.173	1.013	.633	.472	.598	.478	.544	.556	.794	1.202	1.180
Birmingham	.932 5	1.451	1.502	.874	1.422	c 1.202	1.023	b .707	.404	b .649	.549	b .532	e .670	a .783	1.418	b 1.131
Otsego	------	------	------	‖	f 1.507	1.207	-----	.572	.514	.656	.476	.577	.545	.756	-----	-----
Battle Creek	------	------	1.494	.837	1.494	1.146	1.032	.600	.486	.673	.476	.575	.480	.674	c 1.221	1.183
Ann Arbor	.908 10	1.450	1.487	.848	1.487	1.171	.996	.685	.426	.607	.533	.550	.517	.772	1.320	a 1.160
Marshall	.893 9	1.423	1.429	.833	1.429	1.186	1.007	.601	.473	.632	.471	.574	.552	.770	1.186	1.118
Albion	.869 2	1.424	1.450	.837	1.450	1.191	.992	.616	.476	.629	.489	.549	.554	.744	1.239	1.119
Tecumseh	------	------	------	**	1.481	1.199	.948	.642	.480	.618	.534	.580	-----	-----	1.323	1.123

† Numbers in this column state the average monthly range of atmospheric pressure for a period of years ending in each case with Dec. 31, 1891. The small figures above and at the right of numbers which state the average, denote the number of years included in the average.

‡ Represents the difference between the highest of 10 stations and the lowest of 10 stations for year and for each month of year, not including Otsego, Gulliver Lake, Rockland and Tecumseh.

¶ Represents sum of ranges at 10 stations divided by 10.

§ The average for 10 months is .910. ‖ For 9 months, .757. ** For 10 months, .893.

a, b, c. In the columns from January to December, inclusive, the letters, a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

a For 30 days. b For 29 days. c For 27 days. d For 26 days. e For 25 days. f For 21 days. g For 16 days.

NOTE.—The statements in the star (*) foot-note to Table XV. apply also to Table XVI.

EXHIBIT 35.—*Average Atmospheric Pressure, by Year and Months in 1891, compared with Annual and Monthly Averages for 1890, and for the 14 years 1877-90. These Averages are for Groups of several Stations in Michigan.*

Years, etc.	Average Atmospheric Pressure.—Inches of Mercury.												
	Annual Av.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 14 years, 1877-90*..	29.157	29.192	29.188	29.150	29.140	29.114	29.109	29.122	29.155	29.193	29.181	29.171	29.175
1890 (12 stations)	29.125	29.187	29.117	29.132	29.195	29.020	29.089	29.115	29.168	29.220	29.028	29.112	29.129
1891 (11 stations)	29.057	29.041	28.993	29.068	29.025	29.118	29.015	29.055	29.035	29.158	29.105	29.048	29.027
In 1891 Greater than Av. for 14 years, 1877-90.....	.....	.....	.....	.....	.....	.004	.....	.....	.....	.....	.....	.....	.....
In 1891 Less than Av. for 14 years, 1877-90..	.100	.151	.195	.087	.115	.....	.094	.067	.120	.035	.076	.123	.148
In 1891 Greater than in 1890	.....	.....	.....	.....	.....	.098	.....	.....	.....	.....	.077	.....	.....
In 1891 Less than in 1890.....	.068	.146	.124	.069	.170	.....	.074	.060	.133	.062	.....	.064	.102

* Woodmere Cemetery (near Detroit) for 1877-79; Mendon for 1877-78, 1881-83; Benton Harbor for 1877-78; Ypsilanti for 1877, 1879; Otisville for 1878-80, 1882; Washington for 1879-80, 1882-3; Nirvana for 1879 and in 1880 to April 25 inclusive; Reed City for 1880 after April 25 and 1881-85; Hastings for 1882; Hillsdale for 1882-83; Manistique for 1884-85; Mackinaw City for 1884-87; Ionia for 1884-85; Swartz Creek for 1885; Port Austin for 1883-84, 1888-89; Marquette for 1879-84, 1886-87; Escanaba for 1880, 1882-87; Alpena, Grand Haven, Port Huron for 1879-87; Detroit for 1878-87; Kalamazoo for 1877-82, 1885-89; Alma for 1890; Gulliver Lake for 1888-90; Tecumseh for 1879-80, 1882-85, 1890; Birmingham for 1887-90; Battle Creek for 1877-80, 1882, 1888-89; Lansing for 1879-90; Agricultural College for 1877, 1881-90; Thornville for 1880-81, 1884-90; Ann Arbor for 1881-90; Traverse City for 1882-90; Harrisville for 1882, 1885-90; Marshall for 1883-90; Albion for 1890.

EXHIBIT 36.—*Comparisons of the Average Atmospheric Pressure during the Year and during each Month of the Year 1891, with Averages for the 16 Years 1875-90, and for the year 1890. Corrected for Temperature and for Instrumental Error. Observations made at 7 A. M., 2 P. M. and 9 P. M., Daily, by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Michigan.*

Years, etc.	Average Atmospheric Pressure.—Inches of Mercury.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 16 years, 1875-90.	29.067	29.083	29.073	29.029	29.043	29.030	29.040	29.060	29.081	29.116	29.083	29.082	29.085
1890.....	29.084	29.146	29.073	29.071	29.142	28.959	29.057	29.093	29.123	29.190	28.981	29.081	29.093
1891.....	29.100	29.079	29.042	29.111	29.047	29.151	29.049	29.096	29.121	29.209	29.145	29.084	29.061
In 1891 Greater than Av. for 16 years, 1875-90	.033	.....	.....	.082	.004	.121	.009	.036	.040	.093	.062	.002	.....
In 1891 Less than Av. for 16 years, 1875-90	.....	.004	.031	.....	.....	.....	.....	.....	.....	.....	.....	.....	.024
In 1891 Greater than in 1890	.016	.....	.....	.040	.....	.192	.....	.003	.....	.019	.164	.003	.....
In 1891 Less than 1890.....	.....	.067	.031	.....	.095	.....	.008	.....	.002	.....	.....	.....	.032

EXHIBIT 37.—*Average Daily Range of Atmospheric Pressure, by Year and Months, in 1891, compared with Annual and Monthly Averages for 1890, and for the Nine years, 1882–90. These Averages are for Groups of several Stations in Michigan.*

Years, etc.	Average Daily Range of Barometer.—Year and Months, 1891.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 9 years, 1882-90*	.213	.326	.308	.260	.217	.164	.140	.122	.135	.167	.208	.253	.269
1890 (12 stations)...	.234	.400	.308	.256	.259	.195	.137	.136	.163	.167	.186	.287	.315
1891 (10 stations)...	.202	.241	.337	.259	.192	.130	.120	.132	.123	.148	.200	.266	.277
In 1891 Greater than Av. for 9 years, 1882-90.....	.....	.....	.029	.....	.....	.....	.....	.010	.....	.....	.....	.013	.008
In 1891 Less than Av. for 9 years, 1882-90.....	.011	.085	.....	.001	.025	.034	.020	.....	.012	.019	.008	.....	.....
In 1891 Greater than in 1890	.....	.....	.029	.003	.....	.....	.....	.....	.....	.....	.014	.....	.....
In 1891 Less than in 1890.....	.032	.159	.....	.....	.067	.065	.017	.004	.040	.019	.....	.021	.038

* Port Austin for 1883-84, 1888-89; Kalamazoo for 1886-89; Mackinaw City for 1884-87; Reed City for 1882-85; Washington, Mendon for 1883; Manistique, Ionia for 1884-85; Swartz Creek for 1885; Marquette for 1882-84, 1886-87; Escanaba, Grand Haven for 1882-87; Alpena, Port Huron, Detroit for 1883-87; Alma for 1890; Tecumseh for 1882-85, 1890; Gulliver Lake for 1888-90; Battle Creek for 1888-89; Traverse City, Lansing, Ann Arbor for 1882-90; Agricultural College, Marshall for 1883-90; Thornville for 1884-90; Harrisville for 1885-90; Birmingham for 1887-90; Albion for 1890.

EXHIBIT 38.—*Range of Atmospheric Pressure, by Year and Months, in 1891, compared with Annual and Monthly Averages for 1890, and for the 9 Years 1882–90. These Averages are for Groups of several Stations in Michigan.*

Years, etc.	Range of Barometer.—Year and Months. 1891.												
	Annual Av.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 9 years, 1882-90*	.993	1.320	1.344	1.202	1.119	.801	.756	.599	.652	.860	1.043	1.099	1.162
1890 (10 stations)...	1.354	1.734	1.485	1.754	1.658	1.205	1.115	.987	.979	1.115	1.478	1.283	1.450
1891 (10 stations)...	.866	1.420	1.209	1.014	.677	.489	.634	.543	.581	.592	.802	1.268	1.171
In 1891 Greater than Av. for 9 years, 1882-90.....	.....	.100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.164	.009
In 1891 Less than Av. for 9 years, 1882-90	.127	.....	.185	.188	.442	.312	.122	.056	.071	.268	.241	.....	.....
In 1891 Greater than in 1890.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
In 1891 Less than in 1890	.488	.314	.276	.740	.981	.716	.481	.444	.398	.523	.676	.020	.279

* Reed City for 1882-85; Port Austin for 1883-84, 1888-89; Washington, Mendon for 1883; Manistique, Ionia for 1884-85; Mackinaw City for 1884-87; Swartz Creek for 1885; Marquette for 1882-84, 1886-87; Escanaba, Grand Haven for 1882-87; Alpena, Port Huron, Detroit 1883-87; Kalamazoo for 1888-89; Gulliver Lake for 1888-90; Traverse City, Lansing, Ann Arbor for 1882-90; Agricultural College, Marshall for 1883-90; Thornville for 1884-90; Harrisville for 1885-90; Birmingham for 1887-90; Tecumseh for 1882-85; Battle Creek for 1888-89; Albion for 1890.

DIAGRAM XVI.—ATMOSPHERIC PRESSURE, BY MONTHS IN 1891.

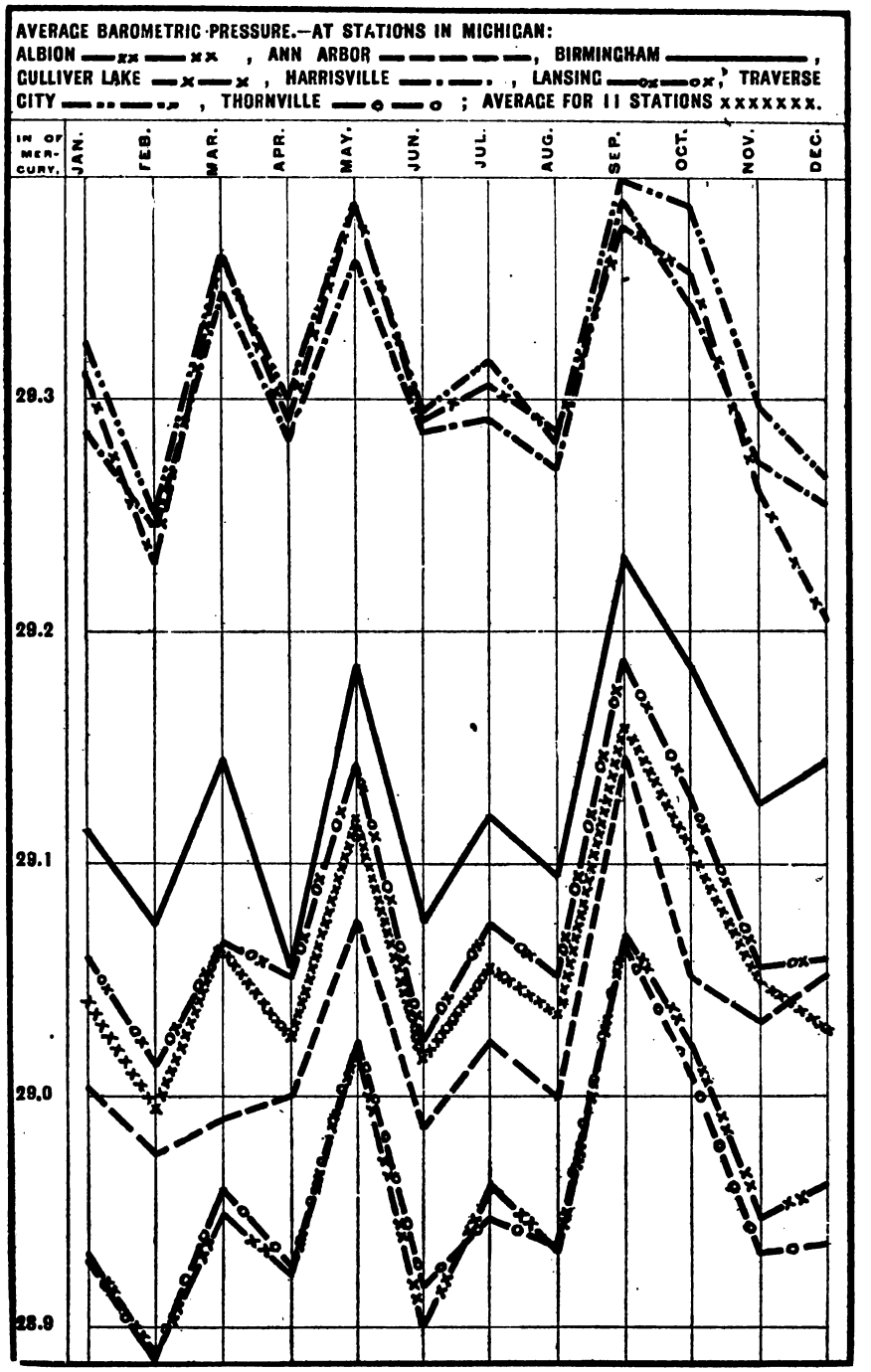


TABLE XVII.—*Average Atmospheric Pressure for the Year, and for each Month in the Year 1891, at each of 12 Stations in Michigan; also Average lines for 11 Stations, as indicated by the height, in inches, of Mercury in the Barometer. Corrected for Temperature.—Reduced to 32° F. (for some stations not corrected for Instrumental Errors*).—Average of Observations made Daily at 7 A. M., 2 P. M. and 9 P. M., by Observers† for the State Board of Health.*

Stations in Michigan†.	Divisions of the State.‡	Inches of Mercury.—Atmospheric Pressure.													
		Years.		Months, 1891.											
		Norm. ‖	1891.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 11 Stations ¶	.....	.....	29.057	29.041	28.993	29.063	29.025	29.118	29.015	29.055	29.035	29.158	29.105	29.048	29.028
Rockland	U. P.	 4	28.672	28.698	28.600	a28.710	28.672	e 28.748	28.665	e 28.706	d 28.679	b 28.738	h 28.690	i 28.636	g 28.475
Gulliver Lake	U. P.	29.306 10	29.304	29.311	29.229	29.362	29.290	29.384	29.290	29.307	29.287	29.374	29.353	29.260	29.204
Traverse City	N. W.	29.338 7	29.321	29.325	29.219	29.362	29.299	29.384	29.294	29.316	29.281	29.395	29.383	29.297	29.266
Harrisville	N. E.	29.310 12	29.301	29.257	29.245	29.346	29.282	29.358	29.285	29.291	29.269	29.387	29.340	29.272	29.254
Thornville	B. & E.	28.954 10	28.955	28.928	28.885	28.958	28.925	29.023	28.917	28.946	28.935	29.064	29.008	28.932	28.936
Agricultural College	C.	29.089 13	29.100	29.079	29.042	29.111	29.047	29.151	29.049	29.096	29.121	29.209	29.145	29.084	29.061
Lansing, S. B. of H.	C.	29.056	29.076	29.059	29.012	29.066	29.050	29.142	29.023	29.074	29.052	29.188	29.129	29.055	29.058
Otsego	S. W.	 2	**	h29.212	29.218	c 29.286	29.243	29.341	29.204	29.269	29.238	29.374	29.331	.....	.....
Albion	S. C.	28.956 11	28.958	28.931	28.888	28.948	28.922	29.018	28.900	28.959	28.932	29.068	29.021	28.947	28.962
Ann Arbor	S. C.	29.031	29.028	29.004	28.974	28.989	29.000	29.075	28.987	29.023	28.999	29.145	29.052	29.031	a 29.052
Battle Creek	S. C.	 9	29.063	29.031	28.991	29.046	29.084	29.125	29.000	29.057	29.023	29.180	29.118	d 29.081	29.069
Marshall	S. C.	29.028	29.023	29.000	28.961	29.013	28.986	29.085	28.969	29.019	28.995	29.127	29.089	29.013	29.030
Tecumseh	S. C.	 5	‡‡	29.102	29.066	29.117	29.090	29.179	29.056	29.112	29.076	j 29.201	.....	29.116	29.139
Birmingham	S. E.	29.118	29.129	29.113	d 29.074	29.144	b 29.055	29.185	b 29.076	29 121	b 29.095	f 29.232	a 29.186	29.127	b 29.143

* A correction has been made for instrumental error of barometer at Agricultural College; .013 has been substracted from each monthly average during the year 1891. For other stations the instrumental error of barometer is not known.

† The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit 1, page 3.

‡ The full names of divisions and the counties in each division are stated in Exhibit I., in a paper which follows on weekly reports of sickness.

‖ Numbers in this column state the average annual atmospheric pressure for periods of years ending in each case with Dec. 31, 1891. The small figures at the right of the numbers which state the average, denote the number of years included in the average.

¶ This line is an average for 11 stations, at which observations were made tri-daily, and from which reports, nearly complete, were received for every month in the year. It does not include Otsego and Tecumseh. Gulliver Lake is not included in "Av. for 11 Stations;" the registers were received too late. Green's standard barometer was used at all the 14 stations for 1891.

** The average for 10 months is 29.272. ‡‡ For 11 months, 29.114.

NOTE.—Computations of monthly averages for the year 1891 were furnished by the observers at Albion and Ann Arbor. The remainder of the computations were made at the office of the State Board of Health.

a For 30 days. b For 29 days. c For 28 days. d For 27 days. e For 26 days. f For 25 days. g For 23 days. h For 21 days. i For 16 days. j For 15 days.

The lines for 8 stations in this table are graphically represented in Diagram XVI., page 72.

DIAGRAMS RELATING TO METEOROLOGICAL CONDITIONS.

Most of the diagrams in this paper are to be read by tracing each irregular line across the diagram from left to right, and noting at what point it intersects each of the perpendicular lines having the name of the month at the top. What station is represented by the irregular line may be learned from the head of the diagram. The degree of value denoted by the intersection may be learned by referring to the figures in the left-hand column. Thus, in Diagram I., page 21, relating to average temperature in 1891, tracing the line "———" representing Gulliver Lake, it may be seen that the average temperature at Gulliver Lake was, in January, about 20°, in March about 23°, in August about 62°, in October about 44°, etc. Definite numerical statements of the average temperature for each month at each station may be found in Table I., page 20, and accompanying each diagram is a table giving exact numerical statements for the conditions represented. The average lines given in each table are represented in the corresponding diagram by an × line, thus × × × ×, and a dotted line. The lines in the diagrams give more ready general comparisons of stations with each other, or of months, with each other, than is possible from the mere numerical statements. By Diagram II., page 27, it appears at a glance that the average daily range of temperature at Birmingham and Marshall in 1891 was, during May, higher than at any other of the ten stations represented in that diagram, and during January was lower at Port Huron. The marked agreement in the course of the lines in Diagram I., page 21, representing mean monthly temperature at seven stations, and also that the agreement is closer in September, October, November and December than in the other months, appear at once on reference to the diagram. The resemblance between the lines in Diagram I., page 21, relating to mean temperature by months in 1891, and those in Diagram III., page 33, relating to absolute humidity of the atmosphere for the same periods, is apparent. By Diagram X., page 57, it appears that in every month of the year the highest velocity of the wind (on an average for the month) is reached between 1 P. M. and 3 P. M., and that the lowest velocity occurs in the latter part of the night or in early morning, and that in 1891 at Lansing, the months of most wind were February and December. By reference to Diagram XI., page 58, it may be seen that at other stations in Michigan where records of actual miles of wind traveled were kept, February and December were, in 1891, the months of greatest wind. These statements illustrate the reading of the diagrams for any use it may be desired to make of the tables and diagrams. The four diagrams relating to direction of the wind are constructed on a different principle and the manner of reading them is explained on preceding pages in this article.

Diagrams XII, XIII, XIV, and XV, relating to the direction of the wind, are constructed on a plan different from that of the other diagrams. A description of the plan of their construction, method of reading, etc., is printed on page 59.

SUNSHINE AND CLOUDS.

The following are statements of the days in each month which were reported "Sunny," "Clear," "Fair," "Cloudless," "Partly Cloudy," and "Cloudy," by observers at stations in Michigan, except Gulliver Lake, where the "Hours of Sunshine" were recorded.

The State Board of Health would be glad to have reports from all observers who can conveniently make them. Memoranda may be made in a column headed "cloudy or sunny," days more than 80 per cent of clouds being marked with the abbreviation "C," indicating *cloudy*, and days with less than 20 per cent of clouds, with an "S," indicating *sunshine*.

ROCKLAND.

JANUARY.—Sunny, 4, 7, 8, 10, 24, 30—6 days. Cloudy, 1, 2, 3, 5, 6, 9, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 25, 26, 27, 28, 29, 31—25 days.

FEBRUARY.—Sunny, 4, 5, 6, 7, 10, 11, 14, 18, 23, 28—10 days. Cloudy, 1, 2, 3, 8, 9, 12, 13, 15, 16, 17, 19, 20, 21, 22, 24, 25, 26, 27—18 days.

MARCH.—Sunny, 1, 4, 5, 12, 13, 14, 16, 18, 19, 20, 24, 25, 26, 27, 28, 29—16 days. Cloudy, 2, 3, 6, 7, 8, 9, 10, 11, 15, 17, 21, 22, 23, 30, 31—15 days.

APRIL.—Sunny, 4, 6, 7, 8, 12, 14, 15, 16, 17, 19, 20, 23, 24, 25, 26, 28, 29, 30—18 days. Cloudy, 1, 2, 3, 5, 9, 10, 11, 13, 18, 21, 22, 27—12 days.

MAY.—Sunny, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29 30—30 days. Cloudy, 31—1 day.

JUNE.—Sunny, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18, 19, 20, 22, 23, 24, 25, 26, 27, 28, 29—24 days. Cloudy, 1, 2, 3, 16, 21, 30—6 days.

JULY.—Sunny, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 15, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31—25 days. Cloudy, 1, 2, 6, 14, 16, 17—6 days.

AUGUST.—Sunny, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 23, 24, 26, 27, 28, 30, 31—26 days. Cloudy, 20, 21, 22, 25, 29—5 days.

SEPTEMBER.—Sunny, 1, 3, 4, 5, 6, 7, 8, 9, 11, 12, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 29, 30—24 days. Cloudy, 2, 10, 13, 14, 27, 28—6 days.

OCTOBER.—Sunny, 11, 12, 20, 22, 23, 24, 25, 28, 29, 30—10 days. Cloudy, 10, 13, 14, 15, 16, 17, 18, 19, 21, 26, 27, 31—12 days. No record for first 9 days.

NOVEMBER.—Sunny, 2, 3, 7, 9, 10, 25—6 days. Cloudy, 1, 4, 5, 6, 8, 11, 12, 13, 24, 26, 27, 28—12 days. No record for the rest of the month.

DECEMBER.—Sunny, 1, 2, 6, 7, 8, 10, 11, 12, 13, 27, 30—11 days. Cloudy, 3, 4, 5, 9, 14, 15, 16, 21, 22, 23, 24, 25, 26, 28, 29, 31—16 days.

OTSEGO.

JANUARY.—Clear, 6, 7, 8. Fair, 3, 11, 15, 20—4 days. Cloudy, 1, 2, 4, 5, 9, 10, 12, 13, 14, 16, 17, 18, 19, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31—24 days.

FEBRUARY.—Clear, 5, 6, 11, 12, 13, 14—6 days. Fair, 4, 7, 10, 15, 25, 28—6 days. Cloudy, 1, 2, 3, 8, 9, 16, 17, 18, 19, 20, 21, 22, 23, 24, 26, 27—16 days.

MARCH.—Clear, 1, 5, 10, 16, 29—5 days. Fair, 2, 4, 12, 14, 17, 20, 25—7 days. Cloudy, 3, 6, 7, 8, 9, 11, 13, 15, 18, 19, 21, 22, 23, 24, 26, 27, 28, 30, 31—19 days.

APRIL.—Clear, 7, 8, 12, 16, 18, 19, 23, 25, 26, 27, 28, 29—12 days. Fair, 4, 5, 6, 10, 13, 20, 21, 22, 24, 30—10 days. Cloudy, 1, 2, 3, 9, 11, 14, 15, 17—8 days.

MAY.—Clear, 1, 3, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 17, 18, 19, 23, 24, 26, 27, 30, 31—21 days. Fair, 16, 28. Cloudy, 2, 4, 10, 20, 21, 22, 25, 29—8 days.

ALBION.

JANUARY.—Fair, 2, 3, 5, 6, 7, 8, 14, 15, 25, 26, 27, 30—12 days. Cloudy, 1, 4, 9, 10, 11, 12, 13, 16, 17, 18, 19, 20, 21, 22, 23, 24, 28, 29, 31—19 days.

FEBRUARY.—Fair, 4, 5, 6, 10, 11, 14, 25—7 days. Clear, 28. Cloudy, 1, 2, 3, 7, 8, 9, 12, 13, 15, 16, 17, 18, 19, 20 21, 22, 23, 24, 26, 27—20 days.

MARCH.—Fair, 1, 2, 4, 5, 10, 12, 13, 14, 16, 17, 25, 28, 29—13 days. Cloudy, 3, 6, 7, 8, 9, 11, 15, 18, 19, 20, 21, 22, 23, 24, 26, 27, 30, 31—18 days.

APRIL.—Sunny, 7, 8, 24, 25, 28—5 days. Fair, 4, 5, 6, 10, 12, 13, 19, 21, 23, 26, 27, 29, 30—13 days. Cloudy, 1, 2, 3, 9, 11, 13, 14, 15, 16, 17, 20, 22—12 days.

MAY.—Sunny, 7, 9, 14, 17, 18, 23, 27—7 days. Fair, 1, 3, 5, 6, 8, 11, 16, 19, 20, 24, 26, 31—12 days. Cloudy, 2, 4, 10, 12, 13, 15, 21, 22, 25, 28, 29, 30—12 days.

JUNE.—Sunny, 8, 13, 22, 23, 25, 27—6 days. Fair, 1, 2, 7, 9, 10, 11, 12, 14, 21, 24, 26, 28, 29, 30—14 days. Cloudy, 3, 4, 5, 6, 15, 16, 17, 18, 19, 20—10 days.

JULY.—Sunny, 5, 9, 10, 12, 19, 21, 28, 30—8 days. Fair, 1, 3, 4, 6, 8, 11, 13, 14, 15, 16, 17, 18, 20, 23, 24, 25, 26, 27, 29, 31—20 days. Cloudy, 2, 7, 22.

AUGUST.—Sunny, 4, 7, 8, 16, 21, 25, 28, 31—8 days. Fair, 3, 5, 6, 9, 10, 12, 13, 14, 15, 18, 19, 24, 26, 29, 30—15 days. Cloudy, 1, 2, 11, 17, 20, 22, 23, 27—8 days.

SEPTEMBER.—Sunny, 1, 8, 9, 10, 13, 16, 17, 20, 23, 26, 30—11 days. Fair, 2, 3, 4, 6, 7, 11, 14, 15, 18, 19, 21, 22, 24, 25, 27, 29—16 days. Cloudy, 5, 12, 27.

OCTOBER.—Sunny, 2, 9, 10, 12, 29—5 days. Fair, 1, 3, 5, 6, 7, 11, 13, 16, 22, 23, 24, 25, 27, 28—14 days. Cloudy, 4, 8, 14, 15, 17, 18, 19, 20, 21, 26, 30, 31—12 days.

NOVEMBER.—Fair, 2, 3, 7, 11, 17, 18, 28, 29, 30—9 days. Cloudy, 1, 4, 5, 6, 8, 9, 10, 12, 13, 14, 15, 16, 19, 20, 21, 22, 23, 24, 25, 26, 27—21 days.

DECEMBER.—Sunny, 5, 13, 18, 20—4 days. Fair, 4, 7, 8, 10, 11, 12, 17, 19, 22, 25, 27, 28, 29, 30—14 days. Cloudy, 1, 2, 3, 6, 9, 14, 15, 16, 21, 23, 24, 26, 31—13 days.

ANN ARBOR.

JANUARY.—Sunny, 8. Cloudy, 1, 2, 9, 10, 11, 12, 13, 16, 17, 18, 19, 20, 21, 22, 23, 26, 28, 31—18 days.*

FEBRUARY.—Sunny, 4, 6. Cloudy, 1, 2, 3, 7, 8, 9, 16, 17, 18, 20, 21, 23, 24—13 days.*

MARCH.—Sunny, 5. Cloudy, 2, 3, 6, 7, 8, 17, 18, 19, 20, 21, 22, 23, 24, 26, 27, 30, 31—17 days.*

APRIL.—Sunny, 7, 8, 25, 26, 27, 28—6 days. Cloudy, 1, 2, 3, 10, 11, 15, 16, 17, 22—9 days.*

MAY.—Sunny, 1, 7, 8, 9, 12, 13, 14, 17, 18, 24, 26, 27, 31—13 days. Cloudy, 2, 20, 21, 22, 25, 28, 29—7 days.*

JUNE.—Sunny, 8, 12, 14, 23, 24, 25, 26, 27—8 days. Cloudy, 3, 4, 6, 15, 17, 18, 19, 20, 21—9 days.*

JULY.—Sunny, 4, 5, 9, 10, 11, 12, 13, 19, 21, 24—10 days.*

SEPTEMBER.—Sunny, 1, 2, 9, 10, 11, 17, 19, 20, 23, 24, 25, 30—12 days. Cloudy, 5.*

OCTOBER.—Clear, 1, 2, 5, 8, 9, 10, 12, 13, 22, 25, 29—11 days. Fair, 3, 6, 7, 11, 15, 16, 17, 23, 26, 27, 28, 30, 31—13 days. Cloudy, 4, 14, 18, 19, 20, 21, 24—7 days.

KALAMAZOO.

JANUARY.—Sunny, 3, 6, 7, 8, 15—5 days. Fair, 19, 31. Cloudy, 1, 2, 4, 5, 9, 10, 11, 12, 13, 14, 16, 17, 18, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30—24 days.

FEBRUARY.—Sunny, 11, 12, 13, 14, 15—5 days. Fair, 10. Cloudy, 1, 2, 3, 4, 5, 6, 7, 8, 9, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28—22 days.

SEPTEMBER.—Sunny, 6, 9, 10, 13, 16, 17, 20, 21, 22, 23, 25, 26, 30—13 days. Fair, 1, 2, 4, 8, 11, 14, 15, 18, 19, 24, 27, 29—12 days. Cloudy, 3, 5, 7, 12, 28—5 days.

OCTOBER.—Sunny, 2, 10, 12, 13, 22, 25, 27—7 days. Fair, 1, 5, 7, 9, 11, 16, 20, 21, 23, 24, 28, 31—12 days. Cloudy, 3, 4, 6, 8, 14, 15, 17, 18, 19, 26—10 days. Hazy, 29, 30.

NOVEMBER.—Sunny, 30. Fair, 2, 18. Cloudy, 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29—27 days.

DECEMBER.—Sunny, 5, 9, 10, 12, 13, 18, 30—7 days. Fair, 7, 8, 11, 19, 20, 21—6 days. Cloudy, 1, 2, 3, 4, 6, 14, 15, 16, 17, 22, 23, 24, 25, 26, 27, 28, 29, 31—18 days.

MARSHALL.

JANUARY.—Fair, 3, 6, 7, 8, 15, 30—6 days. Cloudy, 1, 2, 4, 5, 9, 10, 11, 12, 13, 14, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 31—25 days.

FEBRUARY.—Fair, 4, 5, 6, 11, 12, 13, 14, 15, 23, 25, 28—11 days. Cloudy, 1, 2, 3, 7, 8, 9, 10, 16, 17, 18, 19, 20, 21, 22, 24, 26, 27—17 days.

MARCH.—Fair, 1, 4, 5, 10, 12, 16, 17, 18, 25, 29—10 days. Cloudy, 2, 3, 6, 7, 8, 9, 11, 13, 14, 15, 19, 20, 21, 22, 23, 24, 26, 27, 28, 30, 31—21 days.

APRIL.—Fair, 7, 8, 12, 13, 18, 19, 21, 23, 24, 25, 26, 27, 28, 29—14 days. Cloudy, 1, 2, 3, 4, 5, 6, 9, 10, 11, 14, 15, 16, 17, 20, 22, 30—16 days.

MAY.—Sunny, 1. Fair, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 17, 18, 19, 20, 23, 24, 26, 27, 30, 31—23 days. Cloudy, 2, 10, 16, 21, 22, 25, 28, 29—8 days.

JUNE.—Fair, 1, 7, 8, 9, 11, 12, 13, 14, 15, 22, 23, 24, 25, 26, 27, 29—16 days. Cloudy, 2, 3, 4, 5, 6, 10, 16, 17, 18, 19, 20, 21, 28, 30—14 days.

JULY.—Fair, 3, 4, 5, 8, 9, 10, 11, 12, 13, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 30, 31—24 days. Cloudy, 1, 2, 6, 7, 14, 15, 29—7 days.

AUGUST.—Fair, 3, 4, 5, 6, 7, 8, 10, 11, 12, 15, 16, 17, 18, 19, 20, 21, 22, 25, 26, 28, 29, 31—22 days. Cloudy, 1, 2, 9, 13, 14, 23, 24, 27, 30—9 days.

SEPTEMBER.—Fair, 1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 29, 30—27 days. Cloudy, 3, 14, 28.

OCTOBER—Fair, 2, 3, 5, 6, 7, 9, 10, 11, 12, 13, 21, 22, 23, 24, 25, 27, 28, 29, 30—19 days. Cloudy, 1, 4, 8, 14, 15, 16 17, 18, 19, 20, 26, 31—12 days.

NOVEMBER.—Fair, 2, 28, 29, 30—4 days. Cloudy, 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27—26 days.

DECEMBER.—Fair, 1, 2, 5, 7, 8, 9, 10, 11, 12, 13, 18, 19, 20, 21, 27, 28, 29, 30—18 days. Cloudy, 3, 4, 6, 14, 15, 16, 17, 22, 23, 24, 25, 26, 31—13 days.

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* No record for the rest of the month.

LANSING.

JANUARY.—Sunny, 6, 7, 8, 15, 25—5 days. Cloudy, 1, 2, 3, 4, 5, 9, 10, 11, 12, 13, 14, 16, 17, 18, 19, 20, 21, 22, 23, 24, 26, 27, 28, 29, 30, 31—26 days.

FEBRUARY.—Sunny, 5, 6, 10, 11, 12, 13, 14, 15, 28—9 days. Cloudy, 1, 2, 3, 4, 7, 8, 9, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27—19 days.

MARCH.—Sunny, 1, 5, 10, 12, 14, 16, 25, 28, 29, 30—10 days. Cloudy, 2, 3, 4, 6, 7, 8, 9, 11, 13, 15, 17, 18, 19, 20, 21, 22, 23, 24, 26, 27, 31—21 days.

APRIL.—Sunny, 4, 5, 7, 8, 12, 13, 18, 19, 20, 21, 22, 24, 25, 26, 27, 28, 29—17 days.—Cloudy, 1, 2, 3, 6, 9, 10, 11, 14, 15, 16, 17, 23, 30—13 days.

MAY.—Sunny, 1, 3, 7, 8, 9, 13, 16, 19, 23, 24, 26, 27, 30, 31—14 days. Cloudy, 2, 4, 5, 6, 10, 11, 12, 14, 15, 17, 18, 20, 21, 22, 25, 28, 29—17 days.

JUNE.—Sunny, 5, 7, 8, 11, 12, 14, 15, 22, 23, 25, 26, 27, 29—13 days. Cloudy, 1, 2, 3, 4, 6, 9, 10, 13, 16, 17, 18, 19, 20, 21, 24, 28, 30—17 days.

JULY.—Sunny, 5, 9, 10, 12, 23, 24, 30—7 days. Cloudy, 1, 2, 3, 4, 6, 7, 8, 11, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 25, 26, 27, 28, 29, 31—24 days.

AUGUST.—Sunny, 4, 7, 8, 9, 18, 21, 22, 25, 29—9 days. Cloudy, 1, 2, 3, 5, 6, 10, 11, 12, 13, 14, 15, 16, 17, 19, 20, 23, 24, 26, 27, 28, 30, 31—22 days.

SEPTEMBER.—Sunny, 1, 2, 10, 11, 13, 15, 17, 19, 20, 21, 22, 33, 24, 27, 30—15 days. Cloudy, 3, 4, 5, 6, 7, 8, 9, 12, 14, 16, 18, 25, 26, 28, 29—15 days.

OCTOBER.—Sunny, 2, 6, 8, 9, 10, 11, 12, 13, 16, 22, 23, 27, 29—13 days. Cloudy, 1, 3, 4, 5, 7, 14, 15, 17, 18, 19, 20, 21, 24, 25, 26, 28, 30, 31—18 days.

NOVEMBER.—Sunny, 2, 29, 30. Cloudy, 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28—27 days.

DECEMBER.—Sunny, 1, 5, 8, 9, 10, 11, 12, 13, 18, 19, 20, 21, 27, 28, 29, 30—16 days. Cloudy, 2, 3, 4, 6, 7, 14, 15, 16, 17, 22, 23, 24, 25, 26, 31—15 days.

MANISTEE.

JANUARY.—Sunny, 6, 7, 8, 9, 30—5 days. Fair, 2, 10, 18, 27, 28—5 days. Cloudy, 1, 3, 4, 5, 11, 12, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 25, 26, 29, 31—21 days.

FEBRUARY.—Sunny, 6, 7, 10, 11, 12, 13, 14, 26—8 days. Fair, 8, 15, 18, 19, 21, 23—6 days. Cloudy, 1, 2, 3, 4, 5, 9, 16, 17, 20, 22, 24, 25, 27, 28—14 days.

MARCH.—Cloudless days, 7. Partly cloudy, 7. Cloudy, 17.

APRIL.—Cloudless days, 15. Partly cloudy, 9. Cloudy, 6.

MAY.—Cloudless days, 22. Partly cloudy, 8. Cloudy, 1.

JUNE.—Cloudless days, 13. Partly cloudy, 12. Cloudy, 5.

JULY.—Cloudless days, 16. Partly cloudy, 14. Cloudy, 1.

AUGUST.—Cloudless days, 18. Partly cloudy, 9. Cloudy, 4.

SEPTEMBER.—Cloudless days, 23. Partly cloudy, 4. Cloudy, 3.

OCTOBER.—Cloudless days, 9. Partly cloudy, 13. Cloudy, 9.

NOVEMBER.—Cloudless days, 3. Partly cloudy, 5. Cloudy, 22.

DECEMBER.—Cloudless days, 9. Partly cloudy, 11. Cloudy, 11.

ALPENA.

JANUARY.—Sunny, 7, 27, 28. Cloudy, 1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 29, 30, 31—28 days.

FEBRUARY.—Sunny, 4, 12, 26. Cloudy, 1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 27, 28—25 days.

MARCH.—Cloudless days, 6. Partly cloudy, 9. Cloudy, 16.

APRIL.—Cloudless days, 7. Partly cloudy, 11. Cloudy, 12.

MAY.—Cloudless days, 16. Partly cloudy, 11. Cloudy, 4.

JUNE.—Cloudless days, 10. Partly cloudy, 6. Cloudy, 14.

JULY.—Cloudless days, 9. Partly cloudy, 15. Cloudy, 7.

AUGUST.—Cloudless days, 8. Partly cloudy, 15. Cloudy, 8.

SEPTEMBER.—Cloudless days, 16. Partly cloudy, 8. Cloudy, 6.

OCTOBER.—Cloudless days, 6. Partly cloudy, 17. Cloudy, 8.

NOVEMBER.—Cloudless days, 2. Partly cloudy, 6. Cloudy, 22.

DECEMBER.—Cloudless days, 8. Partly cloudy, 10. Cloudy, 13.

GRAND HAVEN.

JANUARY.—Sunny, 2, 6, 7, 8, 9, 11, 30—7 days. Cloudy, 1, 3, 4, 5, 10, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 31—24 days.

FEBRUARY.—Sunny, 5, 6, 7, 10, 11, 12, 13, 14, 15, 23, 25—11 days. Cloudy—1, 2, 3, 4, 8, 9, 16, 17, 18, 19, 20, 21, 22, 24, 26, 27, 28—17 days.

MARCH.—Cloudless days, 4. Partly cloudy, 4. Cloudy, 23.

APRIL.—Cloudless days, 9. Partly cloudy, 9. Cloudy, 12.

MAY.—Cloudless days, 17. Partly cloudy, 7. Cloudy, 7.

JUNE.—Cloudless days, 11. Partly cloudy, 13. Cloudy, 6.
JULY.—Cloudless days, 16. Partly cloudy, 12. Cloudy, 3.
AUGUST.—Cloudless days, 9. Partly cloudy, 15. Cloudy 7.
SEPTEMBER.—Cloudless days, 23. Partly cloudy, 3. Cloudy, 4.
OCTOBER.—Cloudless days, 11. Partly cloudy, 9. Cloudy, 11.
NOVEMBER.—Cloudless days, 1. Partly cloudy, 4. Cloudy, 25.
DECEMBER.—Cloudless days, 6. Partly cloudy. 12. Cloudy, 13.

PORT HURON.

JANUARY.—Cloudless, 8, 9. Partly cloudy, 7, 15, 30. Cloudy, 1, 2, 3, 4, 5, 6, 10, 11, 12, 13, 14, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 31—26 days.
FEBRUARY.—Cloudless, 4, 10, 11, 12—4 days. Partly cloudy, 5, 6, 14, 18, 19, 21, 22, 23, 25, 26, 27—11 days. Cloudy, 1, 2, 3, 7, 8, 9, 13, 15, 16, 17, 20, 24, 28—13 days.
MARCH.—Cloudless days, 8. Partly cloudy, 5. Cloudy, 18.
APRIL.—Cloudless days, 11. Partly cloudy, 10. Cloudy, 9.
MAY.—Cloudless days, 14. Partly cloudy, 11. Cloudy, 6.
JUNE.—Cloudless days, 12. Partly cloudy, 8. Cloudy, 10.
JULY.—Cloudless days, 12. Partly cloudy, 18. Cloudy, 1.
AUGUST.—Cloudless days, 8. Partly cloudy, 15. Cloudy, 8.
SEPTEMBER.—Cloudless days, 15. Partly cloudy, 13. Cloudy, 2.
OCTOBER.—Cloudless days, 7. Partly cloudy, 18. Cloudy, 6.
NOVEMBER.—Cloudless days, 1. Partly cloudy, 11. Cloudy, 18.
DECEMBER.—Cloudless days, 11. Partly cloudy, 12. Cloudy, 8.

DETROIT.

JANUARY.—Partly cloudy, 4, 7, 8, 15, 24, 25, 27, 30—8 days. Cloudy, 1, 2, 3, 5, 6, 9, 10, 11, 12, 13, 14, 16, 17, 18, 19, 20, 21, 22, 23, 26, 28, 29, 31—23 days.
FEBRUARY.—Cloudless, 4, 11, 15. Partly cloudy, 2, 3, 5, 6, 10, 12, 13, 18, 23, 25, 28—11 days. Cloudy, 1, 7, 8, 9, 14, 16, 17, 19, 20, 21, 22, 24, 26, 27—14 days.
MARCH.—Cloudless days, 5. Partly cloudy, 9. Cloudy, 17.
APRIL.—Cloudless days, 8. Partly cloudy, 12. Cloudy, 10.
MAY.—Cloudless days, 15. Partly cloudy, 10. Cloudy, 6.
JUNE —Cloudless days, 13. Partly cloudy, 9. Cloudy, 8.
JULY.—Cloudless days, 10. Partly cloudy, 14. Cloudy, 7.
AUGUST.—Cloudless days, 8. Partly cloudy, 15. Cloudy, 8.
SEPTEMBER.—Cloudless days, 18. Partly cloudy, 11. Cloudy, 1.
OCTOBER.—Cloudless days, 11. Partly cloudy, 12. Cloudy, 8.
NOVEMBER.—Cloudless days, 3. Partly cloudy, 7. Cloudy, 20.
DECEMBER.—Cloudless days, 12. Partly cloudy, 6. Cloudy, 13.

MARQUETTE.

FEBRUARY.—Cloudless days, 2. Partly cloudy, 15. Cloudy, 11.
MARCH.—Cloudless days, 10. Partly cloudy, 9. Cloudy, 12.
APRIL.—Cloudless days, 10. Partly cloudy, 9. Cloudy, 11.
MAY.—Cloudless days, 14. Partly cloudy, 11. Cloudy, 6.
JUNE.—Cloudless days, 10. Partly cloudy, 10. Cloudy, 10.
JULY.—Cloudless days, 6. Partly cloudy, 14. Cloudy, 11.
AUGUST.—Cloudless days, 10. Partly cloudy, 15. Cloudy, 6.
SEPTEMBER.—Cloudless days, 11. Partly cloudy, 13. Cloudy, 6.
OCTOBER.—Cloudless days, 7. Partly cloudy, 8. Cloudy, 16.
NOVEMBER.—Cloudless days, 5. Partly cloudy, 7. Cloudy, 18.
DECEMBER.—Cloudless days, 8. Partly cloudy, 8. Cloudy, 15.

GULLIVER LAKE.

JANUARY.—Hours of sunshine, 98.
FEBRUARY.—Hours of sunshine, 113½.
MARCH.—Hours of sunshine, 162½.
APRIL.—Hours of sunshine, 215.
MAY.—Hours of sunshine, 349.
JUNE.—Hours of sunshine, 310.
JULY.—Hours of sunshine, 280½.
AUGUST.—Hours of sunshine, 295.30.
SEPTEMBER.—Hours of sunshine, 231.
OCTOBER.—Hours of sunshine, 146.
NOVEMBER.—Hours of sunshine, 41½.
DECEMBER.—Hours of sunshine, 99¼.

THE TIME OF GREATEST PREVALENCE OF EACH DISEASE.

CONTRIBUTIONS TO THE STUDY OF THE CAUSES OF SICKNESS.

A STATISTICAL REPORT BASED ON WEEKLY REPORTS OF SICKNESS IN MICHIGAN DURING THE YEAR 1891, AND PRECEDING YEARS.

BY THE SECRETARY OF THE STATE BOARD OF HEALTH.

This paper is the fifteenth in a series of articles upon the same general subject begun in the latter part of 1876. It presents a summary of the compilation of weekly reports of sickness in Michigan in 1891. It includes a series of diagrams or graphic illustrations which show by months in 1891, the rise and fall of twenty-eight of the most prominent diseases in Michigan.

Propositions are stated as to the relations of specified meteorological conditions, and diseases are mentioned under these propositions in such manner as to suggest one method of studying some of the facts brought out in the compilation.

Tables are given showing the per cent of the weekly *reports* which stated the presence of the various diseases, first (in Exhibit IV.), for each of the years 1879–1891, and an average for 1877–1890, also for the five years, 1886–1890; and secondly (in Exhibit IV. continued), by months, in each of the years 1890, 1891, and the average for the period of fourteen years 1877–1890, also for the period of five years, 1886–1890, the diseases being arranged in the order of their greatest reported prevalence in 1891, to facilitate a comparison with the prevalence of the same diseases in previous years, and in corresponding months in previous years.

The per cent of *observers* stating the presence of each of the diseases is given in Table 1, for the year 1891, and, for comparison, for each of the years 1879–1890, and, in Table 1 continued, for the months in the year 1891, and, for comparison, by months in the year 1890, and the average by months for the period 1877–90, also for the period of five years, 1886–1890.

Comparing Table 1, with Exhibit IV., we see the correspondence in the two lines of evidence,—that of the "prevalence" of the diseases as shown by the per cent of *reports*, and the "area of prevalence" as shown by the per cent of *observers*, the diseases following each other in a somewhat similar order from highest to lowest—the diseases being arranged in the table, as in the exhibit, in the order of their greatest reported prevalence in 1891.

One of the objects of this compilation is to learn the time of the greatest and of the least prevalence of the more important diseases in the State, and to note the connection of this prevalence with each of the meteoro-

logical conditions in the State. Casual observation shows that certain diseases are much more prevalent in the hot months, while certain other diseases are much more prevalent in the cold months. The relation between these diseases and the atmospheric temperature is well marked, but accurate statistics are needed to show just what that relation is. We find, also, that other meteorological conditions than atmospheric temperature have a marked effect upon many of the diseases, apparently diminishing the effect of temperature in some instances, increasing its effect in other instances. For these reasons the State Board of Health undertakes, by a compilation of the weekly reports of sickness in connection with the various meteorological conditions, to learn what causal relations exist between the humidity of the air, the ozone, the velocity of the wind, the atmospheric pressure, etc., and the increased or diminished prevalence of diseases in certain months as compared with other months in the same year, or with the same months in other years or series of years.

Since 1876, when this system of "weekly reports of sickness" was begun, an important work has been accomplished in learning the time of the greatest prevalence of each of several of the most important diseases, and consequently the time of greatest danger from each such disease in the State considered as a unit. To facilitate the study of the causes of sickness and deaths, the State is divided into eleven geographical divisions, a list of which, and the counties embraced in each, appear in Exhibit I., page 85. From some of these divisions sufficient data are not yet received to make the study of the comparative prevalence of diseases in different parts of the State practicable. The number of reports from localities in the newer parts of the State is increasing, however, and a comparison of sickness by localities may become practicable in the near future.

PHYSICIANS' WEEKLY REPORTS OF SICKNESS.

Weekly reports are now received concerning twenty-eight diseases, the names of which are printed on the blank postal used for the weekly report, and concerning these twenty-eight diseases a positive report is made each week by each of many of the leading physicians in Michigan.

Great credit is due the busy medical practitioners in Michigan who forward these reports of sickness. Some of them have made the reports regularly since this plan was adopted in 1876. The service is, as a rule, without compensation; a few health officers have slight pay from their local boards of health. Each one should have full compensation. No other class of persons has knowledge of the facts that are necessary in the compilation of health statistics; and it is greatly to the credit of physicians that they are so willing to coöperate in every effort made to advance the public health.

PLAN OF THE WEEKLY CARD-REPORTS.

The plan of the weekly reports remains the same as last year. (Cards having *Pleuritis* printed on them were first used for weekly reports in October, 1887.) Observers now report only the diseases under their own personal observation. Previous to the year 1885, some of the observers reported such diseases as they believed to be present in their locality, even though not under their own observation. The change in method of making the reports may account partially for the apparent decrease in

sickness in 1891, when compared with the average for the fourteen years, 1877–90. Details of the method of securing and the plan of marking these reports may be thus stated:—

The blanks for the weekly reports are printed on postal cards, which are supplied to the observers of diseases. Blank record books in which to preserve copies of the reports, remarks, etc., are also supplied to these observers, to be retained by them. The reports are forwarded weekly to the Secretary of the State Board of Health at Lansing.

The plan of making the report is as follows: Each observer is requested to mark the disease of which there was the greatest number of cases under his observation during the week for which the report is made, 1; that of which there was the next greatest number of cases, 2; the next, 3; and so on, applying *consecutive* numbers to the diseases reported present; but marking with the *same* figure all diseases of which there is the same number of cases; to write 0 opposite each disease mentioned of which there was no case; to apply these numbers without regard to the severity of the cases; to include all cases, without regard to when they were taken sick, so long as they are actually sick with the given disease; to include all cases "under the observation" of the observer. A blank is left on the card for the convenience of those observers who prefer to state the number of cases rather than the order of prevalence by the foregoing method.

To illustrate the method of making the reports, the following copy of one of the blanks now in use is given, correctly marked, in the "prevalence" column, for the number of cases stated on the right-hand margin. It should be remembered that the numbers in the "prevalence" column denote simply the relative order in which the several diseases appear to be prevalent, and do not denote a definite number of cases; so that a disease might one week be marked *4*, and the following week, with the same number of cases, be marked *1*. Names of diseases and figures printed in italics are not *printed* on the postal blanks, but are supposed to have been *written* on the report by the observer.

*Diseases in*_____ [and vicinity?]

☞ PLEASE DATE. ☜

week ending Sat.,_____, *189*____

ED. 32.		Prevalence, Order. See a.	*Cases.*
	Brain, Inflammation of	*14*	*1*
	Bowels, Inflammation of	*12*	*3*
	Bronchitis	*11*	*4*
	Cerebro-spinal Meningitis	*0*	*0*
	Cholera Infantum	*8*	*9*
	Cholera Morbus	*10*	*6*
	Consumption, Pulmonary	*10*	*6*
	Croup, Membranous	*12*	*3*
	Diphtheria	*5*	*14*
	Diarrhea	*3*	*17*
	Dysentery	*8*	*9*
	Erysipelas	*13*	*2*
	Fever, Intermittent	*2*	*21*
	Fever, Remittent	*11*	*4*
	Fever, Typhoid (Enteric)	*0*	*0*
	Fever, Typho-malarial	*9*	*7*
	Influenza	*7*	*11*
	Kidney, Inflammation of	*14*	*1*
	Measles	*1*	*27*
	Neuralgia	*14*	*1*
	Pleuritis	*0*	*0*
	Pneumonia	*9*	*7*
	Puerperal Fever	*0*	*0*
	Rheumatism	*6*	*12*
	Scarlatina	*4*	*16*
	Small-pox	*0*	*0*
	Tonsillitis	*11*	*4*
	Whooping-cough	*0*	*0*
	Mumps	*6*	*12*
	Dyspepsia	*11*	*4*

a. Please mark the disease of which there is the greatest number of cases, 1; the disease having next greatest number of cases, 2; the next, 3; and so on for each disease, writing the same figures opposite diseases having the same number of cases. Write 0 opposite each disease of which there is no case under your observation. [For full statement of plan, see second, third, and fourth pages of record-book cover.] A blank indicates that the item has been overlooked.

Please mail this, ☞ signed and dated, ☜ as soon as convenient after close of week specified.

☞ This report is of diseases UNDER YOUR OBSERVATION; if it includes a contagious disease, please mention, on the bottom or margin of this card, the township, city, or village in which the disease is.

_____ *M. D.*

BULLETINS OF HEALTH IN MICHIGAN.

During the year 1891 the issue of weekly and monthly bulletins of "Health in Michigan" has been continued. The weekly bulletin is compiled from the physicians' weekly reports from all parts of the State. It is designed to give, each week, information to the public concerning the diseases which cause most sickness in the State, the relative amount of sickness compared with the preceding week—thus showing any sudden increase or decrease which may have occurred in the prevalence of any disease, together with a similar comparison of the various meteorological conditions; also, a list of the localities in which each of the dangerous communicable diseases is reported present. If the newspapers would publish the localities where dangerous diseases are, the information would be valuable to parents who might thus be enabled to avoid taking their children to such places until after the disease had ceased and thorough disinfection had occurred. A copy of this bulletin has been sent to such editors as have expressed a desire to have it for use, entire or in part, in their papers. About forty-eight copies are now used for this purpose each week. An abstract of it also goes to the Michigan Associated Press. The monthly bulletin is similar in character to the weekly bulletin, and shows the relative amount of sickness compared with the average for corresponding months in previous years, and compared with the preceding month, together with a similar comparison of the various meteorological conditions. It is issued as soon as possible after the close of each month, and is sent to the sanitary and medical journals which are received as exchanges by the library of the State Board of Health. About ninety-five copies are thus used at the present time.

As a rule, about three-fourths of the card reports reach the office of the State Board of Health in time for compilation in the weekly bulletin, and the monthly bulletins are compiled from the information used in the weekly bulletins. It is found that the statements made in the monthly bulletins are corroborated by the information obtained after the close of the year, in the compilation of the whole number of the reports for the corresponding months of the year.

COMPILATION OF THE WEEKLY REPORTS.

The reports from each locality are compiled by months. The average of the numbers stating the order of prevalence of the several diseases for the month is considered an indication of the actual order of prevalence of the diseases for that time. There is also found for each locality what per cent of the reports state the presence of each disease for the given month. This per cent of reports for a single locality indicates what part of the month the disease was present in that locality. It may also be called the per cent of weeks the disease was present. These first results of the compilation are stated in Table 3, which, on account of the space required, has not been printed in the reports since that of 1882, but is preserved in the office of the State Board for reference and study.

A combination of the statements for localities in Table 3, is made by months for the State, so far as it is represented by the localities from which reports are received, showing: (1) What per cent of the observers reported each disease each month; (2) for the localities at which a given disease was

reported, an average of the per cent of weeks it was reported at those localities; (3) what per cent of all the reports received for the month stated the presence of each disease; (4) an average of the numbers denoting the order of prevalence of each disease at the localities at which it was reported present during the month.

THE PREVALENCE OF THE SEVERAL DISEASES IN 1891.

By noting the per cent of all the reports received for a given time which stated the presence of each disease, the relative prevalence of the several diseases may be readily seen. This per cent has been computed for each disease, by months, for the year 1891. It is thus stated in Exhibit II., page 86, which also states the per cent for each disease for the year 1891, and an average for the period of fourteen years, 1877–90, also for the period of five years, 1886–1890. What per cent of the reports stated the presence of each disease by months in 1891, is graphically represented in Diagrams 1–5, on page 87, and following pages.

For twenty diseases a comparison has been made of the amount of sickness in 1891 (as indicated by the proportion of reports stating the presence of the disease) with the average amount for a period of fourteen years, also for a recent period of five years. These comparisons are shown in Exhibits XI., XIII., XVIII., and XX. A comparison is made in Table 1, on pages 95, 96 and 97, between the per cent of observers reporting the tabulated diseases present in each of the years 1879–1891, and by months in two of those years; also an average by months for the period of fourteen years 1877–90, also for the period of five years, 1886–1890. In Exhibit IV., on pages 89, 90 and 91, the per cents of reports stating the presence of each of the twenty-eight tabulated diseases, for each of the years 1879–91, and an average by months for the years 1890 and 1891, and for the period of fourteen years, 1877–90, also for the period of five years, 1886–1890, is given. In Table 1, and in Exhibit IV., the diseases are arranged in the order of the greatest per cents for 1891, the highest being placed first.

A study of the reported sickness from twenty-eight diseases, in connection with meteorological conditions by months in 1891, is made in Exhibit X., and following exhibits. By arranging months in order of greatest prevalence of the disease under consideration, noting whether it is more or less prevalent than the average for the year, and noting what were the meteorological conditions for the same months as compared with the average for the year, relations and comparisons are grouped for convenient comparison. A summary of one line of the evidence presented by these exhibits is given in Exhibits XXIV. and XXV.

In Exhibits VI. and VII., on pages 112, 113 and 114, the leading diseases are arranged in order according to the amount of sickness reported from them in 1891, those from which there was most sickness reported being placed first. In these exhibits the diseases are arranged with reference to the per cent of reports taken in connection with the average order of prevalence.

The comparison with former years is facilitated by reference to Exhibit II., page 86, Table 1, pages 95, 96 and 97, Exhibit IV., pages 89, 90 and 91, and Exhibits XI., XIII., XVIII., and XX.

Exhibit IV., on pages 89, 90 and 91, is continued for 1891. In it the diseases are arranged in order of the greatest per cent of reports stating

the presence of the diseases in 1891, the highest per cent being placed first in the line. It is similar in form to Table 1, page 95, which shows the per cent of observers by whom diseases were reported present. It affords a means of comparing the diseases showing greatest prevalence with those showing greatest area of prevalence or widest distribution. It affords also a means for the comparison of per cent of reports in 1891, with the average per cent of reports in the fourteen years, 1877–1890, also in the five years, 1886–1890, both for the year and by months, also by months in 1891 with the year 1890.

DISEASES FROM WHICH THERE WAS A MARKED INCREASE OR DECREASE IN PREVALENCE IN MICHIGAN IN 1891.

By referring to Exhibits II. and IV. it will be seen that influenza was the only disease which showed a marked increase in 1891 over the average for the fourteen years, 1877–1890. The diseases in which the decrease in 1891 appears most marked are small-pox, typho-malarial fever, diphtheria, whooping-cough, intermittent fever, scarlet fever, puerperal fever, remittent fever, inflammation of brain, membranous croup and cerebro-spinal meningitis.

A part of the lessened prevalence of some of the prominent diseases may be due to the change in the method of reporting sickness, referred to in the last paragraph on page 80.

A comparison of 1891 with the average for the five years 1886–1890, shows that influenza was the only disease in which there was a marked increase in 1891; and that small-pox, typho-malarial fever, puerperal fever, whooping-cough and diphtheria are the only diseases in which there was a marked decrease in 1891.

Change in Method of Comparison of Diseases by Years.

In former Reports, ending with the Report for 1888, mention has been made of diseases in which a difference of seven or more was shown between the per cents of reports stating the presence of the disease in the current year and in the preceding year or term of years; now, in this and in the last three preceding Reports those diseases are mentioned of which the comparison shows an increase or decrease of twenty-five per cent from the preceding year, or from the normal, as the case may be.

In Exhibits XI., XIII., XVIII., and XX., the per cent of reports by months in 1891 is placed directly under the per cents for the corresponding months in 1890. A comparison between the corresponding months in the two years is thus made possible, and the comparison of the months in 1891 with the averages for the months in the series of years preceding is made possible by placing the differences, greater or less, in separate lines.

EXHIBIT I.—*Eleven Geographical Divisions of the State, formed for the purpose of facilitating the study of Causes of Sickness and of Deaths, with a list of Counties included in each Division.*

1.—Upper Peninsula.	2.—Northwestern.	3.—Northern.	4.—Northeastern.	5.—Western.	6.—Northern Central.	7.—Bay and Eastern.	8.—Central.	9.—Southwestern.	10.—Southern-Central.	11.—Southeastern.
Alger.	Benzie.	Antrim.	Alcona.	Kent.	Clare.	Arenac.	Barry.	Allegan.	Branch.	Macomb.
Baraga.	Gr. Traverse.	Charlevoix.	Alpena.	Lake.	Gladwin.	Bay.	Clinton.	Berrien.	Calhoun.	Monroe.
Chippewa.	Leelanaw.	Cheboygan.	Iosco.	Mason.	Isabella.	Huron.	Eaton.	Cass.	Hillsdale.	Oakland.
Delta.	Manistee.	Crawford.	Montmorency.	Muskegon.	Mecosta.	Lapeer.	Genesee.	Van Buren.	Jackson.	Wayne.
Dickinson.	Manitou.	Emmet.	Ogemaw.	Newaygo.	Midland.	Saginaw.	Gratiot.		Kalamazoo.	
Gogebic.	Wexford.	Kalkaska.	Oscoda.	Oceana.	Roscommon.	Sanilac.	Ingham.		Lenawee.	
Houghton.		Otsego.	Presque Isle.	Ottawa.	Missaukee.	St. Clair.	Ionia.		St. Joseph.	
Iron.					Osceola.	Tuscola.	Livingston.		Washtenaw.	
Isle Royal.							Montcalm.			
Keweenaw.							Shiawassee.			
Luce.										
Mackinac.										
Marquette.										
Menominee.										
Ontonagon.										
Schoolcraft.										

On pages 230 and 253 of the Report of this Board for 1885, the divisions and the counties in each were indicated by lines on maps of the State. A similar map appears in the article on diphtheria near the end of the present Report.

EXHIBIT II.—*Stating for each of 28 Diseases for the Year ending Saturday, January 2, 1892, by Months of the Year 1891, the average for the period of fourteen years, 1877–90, and the average for the period of five years, 1886–90, on what Per Cent of the reports received each Disease was stated to be present.—Compiled from weekly reports by Health Officers of Cities and Villages, by Regular Correspondents of the State Board of Health, and by other physicians.**

Diseases.	Average, 1877-90.	Average, 1886-90.	What Per Cent of the Reports received stated the Presence of the Disease.												
			Year, 1891.	Months, 1891.											
				Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov	Dec.
Average †	28	25	25	27	27	27	27	25	22	23	26	25	24	23	24
Brain, Inflammation of	6	4	4	3	7	8	4	5	2	5	3	2	3	3	3
Bowels, Inflammation of	15	15	15	10	13	9	12	14	15	15	19	20	15	18	13
Bronchitis	61	59	60	81	79	81	76	64	48	43	36	44	48	57	68
Cerebro-spinal Meningitis	4	3	3	2	4	3	2	3	3	3	2	3	1	1	2
Cholera Infantum	13	12	13	2	2	0.3	0.3	2	7	27	43	41	14	3	3
Cholera Morbus	18	16	16	4	4	5	5	6	15	34	52	37	18	7	5
Consumption, Pulmonary	60	51	49	58	51	54	59	55	46	45	43	43	44	46	45
Croup, Membranous	6	4	4	9	8	10	4	2	1	1	0	1	1	5	6
Diphtheria	18	9	6	8	4	3	4	3	5	7	4	5	9	8	8
Diarrhea	46	45	47	31	27	31	30	37	38	63	86	82	62	38	28
Dysentery	19	17	16	5	6	5	6	9	10	20	42	40	26	11	9
Erysipelas	23	23	19	25	29	25	20	21	19	13	14	13	13	19	20
Fever, Intermittent	64	46	36	36	33	33	33	34	36	44	45	42	38	24	25
Fever, Remittent	43	31	28	31	28	26	25	23	21	28	34	33	37	30	23
Fever, Typhoid (Enteric)	11	9	11	5	5	2	2	3	3	6	12	21	27	21	15
Fever, Typho-malarial	20	14	6	7	5	5	2	2	2	3	6	9	17	7	2
Influenza	39	37	55	80	81	87	95	75	44	30	19	24	29	41	72
Kidney, Inflammation of	21	20	20	19	20	19	21	25	21	20	19	17	19	23	23
Measles	12	11	10	8	12	24	28	23	18	9	5	1	1	1	1
Neuralgia	66	65	66	73	75	73	72	67	67	61	55	58	60	66	66
Pleuritis	....	18	21	31	28	28	31	24	18	10	6	12	19	22	21
Pneumonia	34	28	27	48	49	45	46	32	13	7	8	7	16	21	38
Puerperal Fever	5	5	3	4	4	2	2	3	5	2	1	3	3	2	3
Rheumatism	68	68	69	77	75	76	80	76	69	64	60	60	67	65	67
Scarlatina	15	10	9	11	11	11	11	12	7	7	8	9	10	7	7
Small-pox	0.8	0.12	0	0	0	0	0	0	0	0	0	0	0	0	0
Tonsillitis	48	47	49	61	63	61	61	51	41	38	30	36	46	49	59
Whooping-cough	18	14	9	4	4	5	6	7	7	11	14	12	11	12	9
No. of reports received	4399	5094	4291	318	312	321	361	329	323	366	324	458	383	369	427

* For 1891 the names of observers are stated in Exhibit V., pages 92, 93 and 94.
† This line is an average for such of the tabulated diseases as were reported present in the given month or year.

Statements in this exhibit for months in 1891 are graphically represented in Diagrams 1, 2, 3, 4, 5, opposite this page, and on following pages.

DIAGRAM I —WEEKLY REPORTS OF SICKNESS IN MICHIGAN, IN 1891.

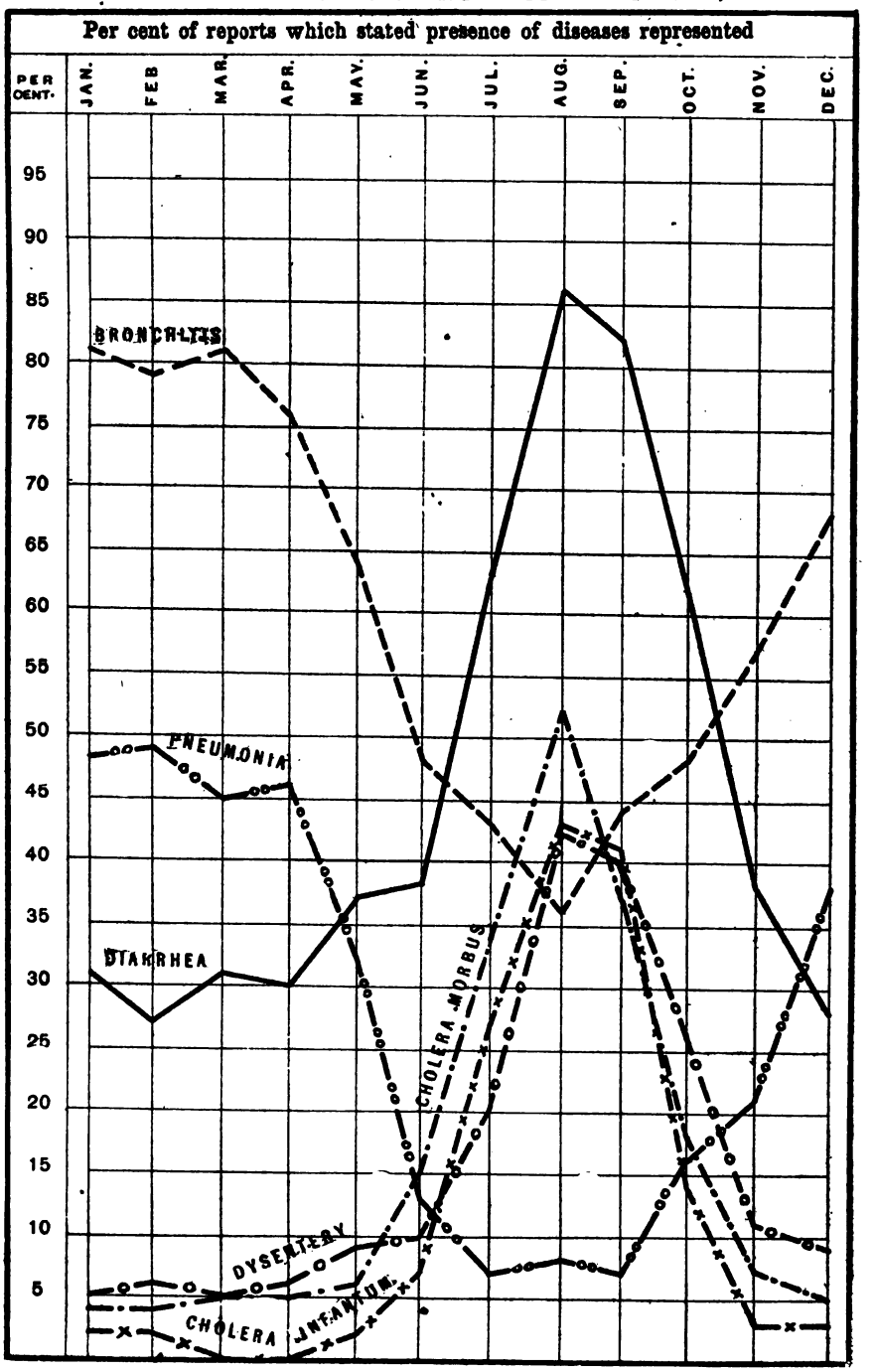

EXHIBIT III.—*Stating, by Months of the Year ending Saturday, January 2, 1892, for the State, and for each of the Eleven Geographical Divisions of Michigan from which Weekly Reports of Diseases were received, the number of Observers from whom the Reports were received; the Number of Reports received; the day on which, for the purposes of this compilation, each month is made to end; and the Nnmber of Weeks thus included in each Month.*

Months, 1991.	Months and Year end Saturday.	Number of weeks.	State.		Divisions of the State.*																			
					1. Upper Peninsula.*		2. Northwestern.*		3. Northern.*		4. Northeastern.*		5. Western.*		6. Northern Central.*		7. Bay and Eastern.*		8. Central.*		9. Southwestern.*		10. Southern Central.*		11. Southeastern.*	
			Observers.‡	Reports.†	Observers.‡	Reports.†	Observers.‡	Reports.†	Observers.‡	Reports.†	Observers.‡	Reports.†	Observers.‡	Reports.†	Observers.‡	Reports.†	Observers.‡	Reports.†	Observers.‡	Reports.†	Observers.‡	Reports.†	Observers.‡	Reports.†	Observers.‡	Reports.†
Year, 1891‡	January 2, 1892.	52	145	4,291	12	339	5	128	2	72	4	103	10	315	5	88	13	384	24	755	15	504	31	858	24	745
Av. per month.			91	358	7	28	3	11	2	6	2	9	7	26	2	7	8	32	16	63	10	42	18	72	16	62
January	January 31	4	88	318	5	17	3	9	1	4	3	9	7	27	2	7	9	31	15	52	10	39	18	67	15	56
February	February 28.	4	87	312	5	18	3	10	1	3	3	9	7	27	2	6	10	31	15	50	9	36	17	64	15	58
March	March 28.	4	88	321	4	16	3	7	1	4	2	8	7	27	2	6	10	35	17	59	9	36	18	67	15	56
April	May 2	5	77	361	4	19	3	13	1	5	2	10	5	22	1	5	8	35	16	76	8	39	16	74	13	63
May	May 30	4	91	329	7	27	3	8	2	7	4	15	5	20	4	13	7	23	15	52	12	48	16	58	16	58
June	June 27	4	91	323	7	23	4	13	2	8	3	10	6	22	3	10	7	24	16	55	12	47	14	49	17	62
July	August 1	5	80	366	5	23	3	13	2	9	1	5	7	30	2	8	6	25	14	66	11	54	13	60	16	73
August	August 29	4	92	324	7	24	2	7	2	8	3	9	6	22	3	10	8	30	16	54	11	39	17	62	17	59
September	October 3	5	98	458	10	47	3	13	2	9	1	5	8	35	1	3	9	44	18	84	10	48	19	93	17	77
October	October 31.	4	103	388	10	38	3	11	2	6	2	7	7	27	2	7	9	33	18	69	11	40	23	86	16	59
November	November 28.	4	101	369	11	38	3	10	1	4	2	8	7	28	2	4	10	36	17	62	11	38	21	82	16	59
December	January 2, 1892.	5	90	427	10	49	3	14	1	5	2	8	6	28	2	9	8	37	16	76	8	40	20	96	14	65

* The counties in each division are given in Exhibit I., page 85. † From some of the observers reports were not received every week, so that the number of reports received does not equal the number of observers multiplied by the number of weeks in the given month or in the year.

‡ In some localities there were more observers than one. The whole number of localities from which reports were received was 126; the average number per month was 86. The names of observers and number of cards received from each observer for each month and for the year are stated in Exhibit V., pages 92, 93, 94.

EXHIBIT IV.—*Stating for each of 28 Diseases, the average for the period of fourteen years, 1877–1890, and for each of the last twelve of those years and 1891, and for the period of five, 1886–1890, on what Per Cent of the Reports received the Diseases were stated to be present. Compiled from Weekly Reports by Health Officers of Cities and Villages and by regular Correspondents of the State Board of Health.* (Continued for each month of 1890 and 1891 on pages 90 and 91.)*

Line Number.	Diseases.	What Per Cent of the Reports stated the Presence of the Disease.														
		Av. 1877-1890.	Av. 1886 1890.	1891.	1890.	1889.	1888.	1887.	1886.	1885.	1884.	1883.	1882.	1881.	1880.	1879.
	Average disease †	28	25	25	25	28	24	25	26	26	29	30	30	33	32	33
1	Rheumatism	68	68	69	71	65	66	69	70	68	70	68	68	71	71	72
2	Neuralgia ‡	66	65	66	67	63	62	67	67	68	70	69	68	65	64	59
3	Bronchitis	61	59	60	65	58	59	55	56	56	61	66	65	62	64	64
4	Influenza	39	37	55	53	32	32	38	35	34	41	43	40	35	42	45
5	Tonsilitis ‡	48	47	49	50	46	41	47	49	50	50	50	48	48	49	45
6	Consumption, Pul.	60	51	49	52	48	49	51	55	58	63	61	66	71	68	70
7	Diarrhea	46	45	47	44	45	41	48	45	46	52	49	48	52	47	48
8	Intermittent Fever	64	46	36	41	43	45	48	54	59	65	69	71	82	82	82
9	Remittent Fever	43	31	28	27	30	34	32	34	36	44	41	48	54	56	57
10	Pneumonia	34	28	27	30	26	30	28	27	27	29	38	39	41	42	41
11	Pleuritis ‡	-----	18	21	19	17	18	-----	-----	-----	-----	-----	-----	-----	-----	-----
12	Inflam. of kidney ‡	21	20	20	21	20	19	18	20	21	26	-----	-----	-----	-----	-----
13	Erysipelas	23	23	19	21	22	24	24	23	24	26	25	22	23	25	25
14	Cholera Morbus	18	16	16	15	14	15	19	17	17	22	18	17	26	20	19
15	Dysentery	19	17	16	16	17	17	19	17	15	23	21	17	23	18	18
16	Inflam. of bowels ‡	15	15	15	14	14	14	16	17	17	17	16	13	14	12	-----
17	Cholera Infantum	13	12	13	10	11	11	13	14	11	15	14	12	18	14	14
18	Typhoid Fever (ent.)	11	9	11	8	10	10	10	8	8	12	11	14	18	14	12
19	Measles	12	11	10	12	6	16	14	6	5	10	24	11	26	19	12
20	Scarlet Fever	15	10	9	10	10	9	8	11	12	16	19	18	19	15	23
21	Whooping-cough	18	14	9	9	16	9	14	20	14	23	15	17	16	32	23
22	Diphtheria	18	9	6	8	6	7	10	13	14	15	17	25	34	27	29
23	Typho- mal. Fever	20	14	6	7	16	15	16	16	16	20	18	24	29	24	22
24	Inflam. of brain ‡	6	4	4	5	5	5	6	5	6	7	6	5	5	6	-----
25	Membranous Croup	6	4	4	4	3	4	4	5	5	6	6	7	9	6	7
26	Puerperal Fever	5	5	3	4	5	4	6	5	6	7	7	7	5	3	3
27	Cerebro-spinal men.	4	3	3	3	3	3	3	4	6	7	5	6	9	2	2
28	Small-pox	0.8	0.12	0	0.1	.03	.03	.02	0.4	0.2	0.1	0.3	3	2	0.4	0.4
	No. of reports received	4,399	5,093	4,291	4,939	5,000	5,047	4,896	5,583	5,103	3,957	4,458	4,745	3,567	3,991	3,755

* For 1891 the number of observers, reports, weeks in each month, etc., are stated in the first five columns of Exhibit III., page 88, the names of the observers and the number of the reports received from each are stated in Exhibit V., pages 92, 93 and 94.

† The numbers opposite the names of the diseases do not state what per cent of the whole number of reports for the year stated the disease to be present at some time during the year, but state (on an average for twelve months of the year), what per cent of reports for the several months stated the disease to be present in those months. The column for each year is thus a statement for an average month of that year. On the two following pages of this table, however, the columns for each month state what per cent of the reports for that month (the number of which is stated at the foot of the column) stated the given disease to be present in that month. [‡ For foot-note see page 94.]

EXHIBIT IV.—CONTINUED —*Stating for each of 28 Diseases by months, on what Per 1890 and 1891; also the Averages by Months for the Period of five years.*

What Per Cent of the Reports Received Stated Presence of the Disease.‡

Line number.	January.* Diseases.	Av. '77-'90.	Av. '86-'90.	1891.	1890.	February.* Diseases.	Av. '77-'90.	Av. '86-'90.	1891.	1890.	March.* Diseases.	Av. '77-'90.	Av. '86-'90.	1891.	1890.
	Average Disease†..	29	25	27	26	Average Disease †..	29	25	27	26	Average Disease †..	29	26	27	25
1	Bronchitis	74	67	81	71	Influenza	61	60	81	95	Influenza	58	57	87	73
2	Influenza	56	54	80	92	Bronchitis	75	71	79	74	Bronchitis	75	71	81	76
3	Rheumatism	72	70	77	73	Rheumatism	72	70	75	69	Rheumatism	74	73	76	72
4	Neuralgia	68	68	73	68	Neuralgia	71	69	75	72	Neuralgia	73	71	73	73
5	Tonsillitis	59	57	61	57	Tonsillitis	60	57	63	56	Tonsillitis	60	58	61	55
6	Consumption, Pul.	60	53	58	50	Consumption, Pul.	62	53	51	53	Consumption, Pul.	63	56	54	55
7	Pneumonia	55	45	48	58	Pneumonia	60	50	49	59	Pneumonia	57	49	45	44
8	Intermittent Fev..	52	39	36	33	Intermittent Fever	54	40	38	33	Intermittent Fever	57	42	33	33
9	Diarrhea	27	26	31	27	Erysipelas	27	25	29	23	Diarrhea	29	29	31	31
10	Remittent Fever..	36	28	31	22	Pleuritis	26	26	28	26	Pleuritis	28	28	28	29
11	Pleuritis	24	24	31	25	Remittent Fever...	35	26	28	19	Remittent Fever...	37	27	26	20
12	Erysipelas	26	24	25	23	Diarrhea	28	28	27	28	Erysipelas	27	26	25	21
13	Inflam. of Kidney.	22	20	19	17	Inflam. of Kidney.	23	20	20	22	Measles	16	16	24	19
14	Scarlet Fever	20	13	11	8	Inflam. of Bowels..	13	13	13	13	Inflam. of Kidney.	23	22	19	22
15	Inflam. of Bowels.	13	14	10	10	Measles	14	14	12	19	Scarlet Fever	20	11	11	9
16	Membran. Croup..	10	7	9	4	Scarlet Fever	20	11	11	8	Membranous Croup	7	4	10	4
17	Measles	11	10	8	12	Membranous Croup	8	5	8	3	Inflam. of Bowels.	14	14	9	11
18	Diptheria	23	12	8	9	Inflam. of Brain...	6	6	7	5	Inflam. of Brain...	6	6	8	4
19	Typho-mal. Fever.	15	9	7	4	Dysentery	7	7	6	7	Cholera Morbus	5	3	5	2
20	Typhoid Fev.(ent.)	10	7	5	6	Typhoid Fev. (ent.)	8	5	5	1	Whooping-cough ..	18	15	5	12
21	Dysentery	7	6	5	6	Typho-mal. Fever..	13	8	5	2	Typho-mal. Fever..	12	8	5	2
22	Cholera Morbus...	4	3	4	1	Cerebro-spi. Men...	4	4	4	5	Dysentery	7	7	5	6
23	Puerperal Fever ..	5	5	4	5	Diphtheria	13	9	4	9	Cerebro-spi. Men...	5	4	3	5
24	Whooping-cough ..	18	12	4	10	Whooping-cough ..	18	14	4	13	Diphtheria	17	8	3	6
25	Inflam. of Brain ..	6	6	3	4	Cholera Morbus ..	4	2	4	3	Typhoid Fev. (ent.)	6	4	2	2
26	Cerebro-spin. Men.	3	2	2	2	Puerperal Fever...	5	5	4	5	Puerperal Fever....	6	6	2	3
27	Cholera Infantum.	2	2	2	1	Cholera Infantum.	1	1	2	0.3	Cholera Infantum.	2	2	0.3	1
28	Small-pox	1.4	0.5	0	0	Small-pox	1.1	0.6	0	1	Small-pox	0.7	0.1	0	0.3
	Reports Received§	369	414	318	425	Reports Received§	337	394	312	348	Reports Received§	354	404	321	346

Line number.	April.* Diseases.	Av. '77-'90.	Av. '86-'90.	1891.	1890.	May.* Diseases.	Av. '77-'90.	Av. '86-'90.	1891.	1890.	June.* Diseases.	Av. '77-'90.	Av. '86-'90.	1891.	1890.
	Average Disease†..	29	26	27	26	Average Disease †..	27	25	25	25	Average Disease †..	26	23	22	23
1	Influenza	51	48	95	58	Rheumatism	72	73	76	78	Rheumatism	68	70	69	70
2	Rheumatism	75	75	80	79	Influenza	38	36	75	44	Neuralgia	64	63	67	65
3	Bronchitis	70	67	76	74	Neuralgia	67	67	67	70	Bronchitis	53	51	48	56
4	Neuralgia	72	71	72	75	Bronchitis	61	61	64	66	Consumption, Pul.	60	52	46	52
5	Tonsillitis	53	52	61	53	Consumption, Pul.	61	54	55	57	Influenza	27	25	44	30
6	Consumption, Pul.	65	56	59	61	Tonsillitis	47	46	51	55	Tonsillitis	40	38	41	41
7	Pneumonia	50	41	46	40	Diarrhea	35	33	37	29	Diarrhea	44	41	38	42
8	Intermittent Fev..	64	49	33	40	Intermittent Fever	69	47	34	40	Intermittent Fever	71	49	36	43
9	Pleuritis	23	23	31	22	Pneumonia	38	32	32	30	Remittent Fever	42	29	21	26
10	Diarrhea	31	30	30	28	Inflam. of Kidney.	23	23	25	25	Inflam. of Kidney.	22	21	21	21
11	Measles	21	18	28	21	Pleuritis	19	19	24	22	Erysipelas	24	24	19	25
12	Remittent Fever..	40	30	25	23	Remittent Fever...	41	29	23	26	Pleuritis	14	14	18	14
13	Inflam. of Kidney.	24	24	21	29	Measles	25	21	23	22	Measles	21	18	18	22
14	Erysipelas	28	28	20	24	Erysipelas	26	25	21	23	Inflam. of Bowels.	15	14	15	15
15	Inflam. of Bowels.	12	12	12	13	Inflam. of Bowels.	14	15	14	12	Cholera Morbus	17	14	15	11
16	Scarlet Fever	19	11	11	8	Scarlet Fever	17	10	12	8	Pneumonia	23	18	13	14
17	Dysentery	8	7	6	6	Dysentery	9	9	9	8	Dysentery	13	10	10	13
18	Whooping-cough.	17	15	6	13	Whooping-cough ..	18	17	7	15	Cholera Infantum.	10	9	7	7
19	Cholera Morbus...	5	4	5	3	Cholera Morbus....	8	7	6	4	Scarlet Fever	14	9	7	9
20	Membran. Croup..	6	5	4	5	Inflam. of Brain...	6	5	5	5	Whooping-cough...	18	14	7	9
21	Inflam. of Brain...	7	6	4	5	Cerebro-spi. Men...	5	4	3	4	Puerperal Fever...	5	5	5	4
22	Diphtheria	16	7	4	5	Puerperal Fever...	5	5	3	6	Diphtheria	12	6	5	5
23	Cerebro-spi. Men..	6	4	2	4	Diphtheria	14	8	3	8	Typhoid Fev. (ent.)	5	5	3	5
24	Typho-mal. Fever.	11	10	2	5	Typhoid Fev. (ent.)	5	4	3	2	Cerebro-spi. Men...	4	3	3	3
25	Typhoid Fev.(ent.)	5	3	2	2	Cholera Infantum.	3	3	2	3	Typho-mal. Fever.	11	8	2	3
26	Puerperal Fever...	5	6	2	5	Membranous Croup	5	4	2	4	Inflam. of Brain...	6	6	2	5
27	Cholera Infantum.	2	1	0.3	1	Typho-mal. Fever..	11	8	2	6	Membranous Croup	3	3	1	3
28	Small-pox	1.2	0.06	0	0	Small-pox	1.7	0.04	0	0	Small-pox	1.4	0.08	0	0
	Reports Received§	313	346	361	363	Reports Received§	360	421	329	371	Reports Received§	360	348	323	383

* For 1891 the number of observers, reports, weeks in each month, etc., are stated in the first five columns of Exhibit III., page 88, the names of observers and the number of reports received from each are stated in Exhibit V., pages 92, 93 and 94.

† The numbers in this line are an average, not for all diseases represented, but only for those reported present in the given month. ‡ See foot-note with this mark on page 88.

§ The numbers in this line state how many reports were received for the month in the given year.

Cent of the Reports Received the diseases were stated to be present in each of the years 1886-1890, and for the Period of fourteen years, 1877-1890.

What Per Cent of the Reports Received Stated Presence of the Disease.‡

July.* Diseases.	Av. '77-'90.	Av. '86-'90.	1891.	1890.	August.* Diseases.	Av. '77-'90.	Av. '86-'90.	1891.	1890.	September.* Diseases.	Av. '77-'90.	Av. '86-'90.	1891.	1890.	Line number.
Average Disease†..	28	25	23	24	Average Disease †..	31	27	26	27	Average Disease †..	31	27	25	26	
Rheumatism	62	62	64	68	Diarrhea	85	82	86	82	Diarrhea	79	75	82	71	1
Diarrhea	72	69	63	68	Rheumatism	58	59	60	62	Rheumatism	62	65	60	71	2
Neuralgia	60	61	61	61	Neuralgia	58	59	55	61	Neuralgia	60	60	58	64	3
Consumption, Pul.	57	48	45	45	Cholera Morbus	56	54	52	54	Bronchitis	49	48	44	54	4
Intermittent Fev.	72	51	44	44	Intermittent Fever	72	52	45	48	Consumption, Pul.	56	48	43	51	5
Bronchitis	44	44	43	50	Cholera Infantum.	46	44	43	43	Intermittent Fever	72	50	42	43	6
Tonsillitis	32	31	38	38	Consumption, Pul.	55	49	43	50	Cholera Infantum.	34	32	41	26	7
Cholera Morbus	45	40	34	37	Dysentery	53	49	42	41	Dysentery	47	43	40	40	8
Influenza	19	16	30	24	Bronchitis	42	42	36	52	Cholera Morbus	38	36	37	34	9
Remittent Fever	45	31	28	30	Remittent Fever	52	37	34	33	Tonsillitis	37	36	36	41	10
Cholera Infantum.	30	28	27	23	Tonsillitis	32	31	30	37	Remittent Fever	54	39	33	31	11
Dysentery	30	26	20	23	Inflam. of Bowels.	20	20	19	22	Influenza	28	26	24	41	12
Inflam. of Kidney.	19	18	20	20	Influenza	20	16	19	25	Typhoid Fev. (ent.)	20	18	21	15	13
Inflam. of Bowels.	17	18	15	15	Inflam. of Kidney.	17	16	19	17	Inflam. of Bowels.	16	17	20	16	14
Erysipelas	20	19	13	21	Erysipelas	19	18	14	16	Inflam. of Kidney.	17	16	17	18	15
Whooping-cough	20	17	11	12	Whooping-cough	20	15	14	10	Erysipelas	17	18	13	19	16
Pleuritis	11	11	10	13	Typhoid Fev. (ent.)	13	13	12	15	Pleuritis	11	11	12	14	17
Measles	13	10	9	16	Pneumonia	12	10	8	10	Whooping-cough	19	14	12	6	18
Diphtheria	12	6	7	16	Scarlet Fever	10	5	8	8	Typho-mal. Fever	36	26	9	12	19
Pneumonia	15	12	7	13	Typho-mal. Fever	23	19	6	14	Scarlet Fever	11	6	9	7	20
Scarlet Fever	11	6	7	7	Pleuritis	10	10	6	12	Pneumonia	16	14	7	14	21
Typhoid Fev.(ent.)	7	6	6	6	Measles	6	4	5	5	Diphtheria	15	8	5	7	22
Inflam. of Brain	6	5	5	6	Diphtheria	13	6	4	6	Cerebro-spi. Men.	4	3	3	3	23
Typho-mal. Fever.	14	10	3	6	Inflam. of Brain	6	5	3	5	Puerperal Fever	4	4	3	2	24
Cerebro-spi. Men.	4	3	3	3	Cerebro-spi. Men.	4	3	2	2	Inflam. of Brain	6	5	2	3	25
Puerperal Fever	4	4	2	3	Puerperal Fever	4	4	1	1	Membranous Croup	3	2	1	2	26
Membran. Croup	2	1.3	1	2	Membranous Croup	2	1.8	0	2	Measles	4	3	1	3	27
Small-pox	1	0.2	0	0	Small-pox	0.5	0.2	0	0	Small-pox	0.3	0.2	0	0	28
Reports Received§	386	446	366	486	Reports Received§	399	465	324	409	Reports Received§	377	443	458	435	

October.* Diseases.	Av. '77-'90.	Av. '86-'90.	1891.	1890.	November.* Diseases.	Av. '77-'90.	Av. '86-'90.	1891.	1890.	December.* Diseases.	Av. '77-'90.	Av. '86-'90.	1891.	1890.	Line number.
Average Disease†..	29	25	24	25	Average Disease †..	28	24	23	25	Average Disease †..	28	24	24	27	
Rheumatism	67	68	67	68	Neuralgia	67	66	66	66	Influenza	48	45	72	69	1
Diarrhea	54	49	62	54	Rheumatism	71	69	65	74	Bronchitis	70	66	68	79	2
Neuralgia	63	63	60	65	Bronchitis	65	63	57	73	Rheumatism	73	71	67	75	3
Bronchitis	56	58	48	65	Tonsillitis	55	54	49	55	Neuralgia	69	68	66	71	4
Tonsillitis	45	45	46	51	Consumption, Pul.	59	49	46	49	Tonsillitis	58	57	59	61	5
Consumption, Pul.	59	49	44	51	Influenza	40	38	41	56	Consumption, Pul.	60	52	45	55	6
Intermittent Fev.	70	49	38	45	Diarrhea	35	33	38	31	Pneumonia	41	33	38	39	7
Remittent Fever	52	37	37	31	Intermittent Fever	62	44	34	44	Diarrhea	28	27	28	27	8
Influenza	33	33	29	49	Remittent Fever	44	32	30	33	Intermittent Fever	55	39	25	36	9
Typhoid Fev.(ent.)	21	18	27	16	Inflam. of Kidney	20	19	23	24	Remittent Fever	38	29	23	29	10
Dysentery	23	19	26	18	Pleuritis	16	16	22	15	Inflam. of Kidney.	21	20	23	22	11
Inflam. of Kidney.	19	17	19	19	Typhoid Fev. (ent.)	19	14	21	13	Pleuritis	23	23	21	31	12
Pleuritis	14	14	19	14	Pneumonia	31	26	21	25	Erysipelas	24	24	20	23	13
Cholera Morbus	14	11	18	11	Erysipelas	22	22	19	19	Typhoid Fev. (ent.)	14	10	15	7	14
Typho-mal. Fever.	38	26	17	12	Inflam. of Bowels.	13	12	18	9	Inflam. of Bowels.	14	15	13	14	15
Pneumonia	21	18	16	19	Whooping-cough	17	10	12	5	Dysentery	7	7	9	7	16
Inflam. of Bowels	14	14	15	11	Dysentery	11	10	11	9	Whooping-cough	16	10	9	5	17
Cholera Infantum.	12	9	14	8	Diphtheria	24	12	8	11	Diphtheria	23	10	8	10	18
Erysipelas	21	21	13	21	Typho-mal. Fever.	28	17	7	7	Scarlet Fever	16	12	7	12	19
Whooping-cough	16	11	11	3	Scarlet Fever	16	11	7	16	Membranous Croup	9	6	6	9	20
Scarlet Fever	15	11	10	14	Cholera Morbus	6	5	7	6	Cholera Morbus	5	4	5	5	21
Diphtheria	22	12	9	9	Membranous Croup	8	6	5	6	Inflam. of Brain	5	6	3	5	22
Inflam. of Brain	5	5	3	5	Inflam. of Brain	5	5	3	4	Cholera Infantum.	2	2	3	3	23
Puerperal Fever	5	5	3	2	Cholera Infantum.	4	3	3	3	Puerperal Fever	5	5	3	5	24
Cerebro-spi. Men.	4	3	1	2	Puerperal Fever	5	4	2	2	Typho-mal. Fever.	19	11	2	6	25
Membran. Croup	5	5	1	5	Cerebro-spi. Men.	3	3	1	3	Cerebro-spi. Men.	3	3	2	3	26
Measles	4	4	1	4	Measles	6	5	1	4	Measles	7	7	1	7	27
Small-pox	0.4	0.2	0	0	Small-pox	0.6	0.3	0	0	Small-pox	0.7	0.5	0	0	28
Reports Received§	399	467	383	501	Reports Received§	365	427	369	408	Reports Received§	379	429	427	464	

* † ‡ These notes are on page 94.

§ This foot-note is on page 90.

EXHIBIT V.—*By Months and by Geographical Divisions of the State,* the Names of 145 Observers, whose Weekly Reports of Diseases for 1891 are Compiled in Tables 1, 2, 3 and 4, the Localities[a] for which they Report, and the Number of Reports Received from each Observer.*

Divisions and localities represented and physicians who reported. (Health Officers in Italics.)	Weekly Reports in 1891, Compiled in this Article.												
	Year, 1891.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
All localities	4,291	318	312	321	361	329	323	366	324	458	383	369	427
Upper Peninsular Division*	339	17	18	16	19	27	23	23	24	47	38	38	49
Baraga, *A. J. Braden, M. D.*	18	----	----	----	----	----	----	----	----	5	4	4	5
Crystal Falls, *A. A. Metcalf, M. D.*	12	----	----	----	----	----	----	----	----	4	4	4	----
Ironwood, *J. K. Niven, M. D.*	44	2	2	4	4	4	3	4	4	5	4	3	5
Ishpeming, *G. G. Barnett, M. D.*	33	----	----	----	----	4	4	5	4	5	4	2	5
Lake Linden, *Geo. W. Orr. M. D.*	52	4	4	4	5	4	4	5	4	5	4	4	5
Manistique, *Geo. C. Hafford, M. D.*	23	4	4	4	5	4	2	----	----	----	----	----	----
Menominee, *Eugene Grignon, M. D.*	20	----	----	----	----	----	----	----	2	5	4	4	5
Newberry, *S. John Fraser, M. D.*	21	----	----	----	----	3	----	----	----	5	4	4	5
Ontonagon, *J. P. Jordan, M. D.*	18	3	4	----	----	----	2	----	----	----	----	4	5
Palmer, *H. M. Haskell, M. D.*	15	----	----	----	----	----	----	----	2	3	3	3	4
Rockland, *W. C. Gates, M. D.*	31	----	----	----	----	4	4	4	4	5	3	2	5
Wakefield, *J. H. Eddy, M. D.*	52	4	4	4	5	4	4	5	4	5	4	4	5
Northwestern Division*	128	9	10	7	13	8	13	13	7	13	11	10	14
Cadillac, *M. C. Heath, M. D.*	14	3	3	2	4	----	2	----	----	----	----	----	----
Frankfort, *I. Voorheis, M. D.*	31	----	----	----	----	2	4	5	4	5	4	2	5
Fife Lake, *Lewis S. Walter, M. D.*	17	----	----	----	----	----	----	----	----	5	3	4	5
Manistee, *L. A. Pelletier, M. D.*	42	4	3	2	5	3	3	4	3	3	4	4	4
Sutton's Bay, *H. A. Sifton, M. D.*	24	2	4	3	4	3	4	4	----	----	----	----	----
Northern Division*	72	4	3	4	5	7	8	9	8	9	6	4	5
Boyne City, *A. J. De Lacey, M. D.*	50	4	3	4	5	4	4	4	4	5	4	4	5
Kalkaska, *R. S. Trask, M. D.*	22	----	----	----	----	3	4	5	4	4	2	----	----
Northeastern Division*	103	9	9	8	10	15	10	5	9	5	7	8	8
Au Sable, *John Frank Hovis, M. D.*	8	----	----	----	----	3	3	----	2	----	----	----	----
Harrisville, *D. W. Mitchell, M. D.*	52	4	4	4	5	4	4	5	4	5	4	4	5
Rogers City, *R. C. Hill, M. D.*	9	3	2	----	----	4	----	----	----	----	----	----	----
Tawas City, *Geo. S. Darling, M. D.*	34	2	3	4	5	4	3	----	3	----	3	4	3
Western Division*	315	27	27	27	22	20	22	30	22	35	27	28	28
Cannonsburg, *C. B. Crosby, M. D.*	47	4	4	4	5	4	4	4	3	4	3	4	4
Cedar Springs, *C. S. Ford, M. D.*	52	4	4	4	5	4	4	5	4	5	4	4	5
Cedar Springs, *J. B. Dewar, M. D.*	15	----	----	----	----	----	----	----	----	3	4	4	4
Grand Rapids, *A. Hazlewood, M. D.*	51	4	3	4	5	4	4	5	4	5	4	4	5
Grand Haven, *J. B. McNett, M. D.*	12	4	4	4	----	----	----	----	----	----	----	----	----
Grand Haven, *J. N. Reynolds, M. D.*	11	----	----	----	----	----	----	4	3	4	----	----	----
Hesperia, *S. B. Rolison, M. D.*	42	4	4	3	----	----	4	5	4	5	4	4	5
Holland, *Henry Kremers, M. D.*	18	----	----	----	----	----	2	3	----	5	4	4	----
Ludington, *F. W. Graham, M. D.*	47	3	4	4	3	4	4	4	4	4	4	4	5
Muskegon, *H. C. Brown, M. D.*	20	4	4	4	4	4	----	----	----	----	----	----	----
Northern Central Division*	88	7	6	6	5	13	10	8	10	3	7	4	9
Big Rapids, *I. W. Badger, M. D.*	35	4	4	4	5	4	4	4	----	----	4	2	----
Coleman, *A. V. Linton. M. D.*	16	3	2	2	----	2	----	----	3	----	----	----	4
Farwell, *E. B. Evans, M. D.*	8	----	----	----	----	3	2	----	3	----	----	----	----
Morley, *J. McNeece. M. D.*	19	----	----	----	----	4	4	4	4	3	----	----	----
Mt. Pleasant, *S. C. Brown. M. D.*	10	----	----	----	----	----	----	----	----	----	3	2	5
Bay and Eastern Division*	384	31	31	35	35	23	24	25	30	44	33	36	37
Algonac, *W. K. Moore, M. D.*	41	2	2	3	4	3	3	3	4	5	4	4	4
Cass City, *J. M. Truscott, M. D.*	32	----	----	----	----	3	3	4	4	5	4	4	5
Croswell, *T. S. Kingston, M. D.*	52	4	4	4	5	4	4	5	4	5	4	4	5
Grindstone City, *W. J. Herrington, M D.*	15	4	2	3	4	2	----	----	----	----	----	----	----
Marine City, *F. Blagborne, M. D.*	21	----	----	----	----	----	----	----	4	5	4	4	4
Port Sanilac, *J. M. Loop, M. D.*	11	3	4	4	----	----	----	----	----	----	----	----	----
Pt. Huron, *Frederick Lohrstorfer, M. D.*	15	4	2	4	5	----	----	----	----	----	----	----	----
Port Austin, *E. B. Gibson, M. D.*	44	2	3	3	4	3	3	4	4	5	4	4	5
Reese, *Geo. Walworth, M. D.*	11	----	----	----	----	----	----	----	2	4	3	2	----
Saginaw (West), *N. D. Lee, M. D.*	52	4	4	4	5	4	4	5	4	5	4	4	5
Sand Beach, *Howard Carey, M. D.*	12	----	2	2	3	----	3	----	----	----	----	2	----
Thornville, *J. S. Caulkins, M. D.*	48	4	4	4	5	4	4	4	4	5	2	4	4
Vassar, *W. H. Smith, M. D.*	30	4	4	4	----	----	----	----	----	5	4	4	5

a In many cases the reports include sickness in the vicinity as well as the corporate limits of the places named.

* For counties in each division see Exhibit I., page 85.

EXHIBIT V.—CONTINUED.

Divisions and localities represented and physicians who reported. (Health officers in Italics.)	Weekly Reports in 1891.—Compiled in this Article.												
	Year, 1891.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Central Division *	755	52	50	59	76	52	55	66	54	84	69	62	76
Alma, *I. N. Brainerd, M. D.*	45	---	4	4	5	3	2	5	4	5	4	4	5
Brighton, *A. E. Boylan, M. D.*	48	4	4	3	5	4	4	4	3	5	4	4	4
Carson City, *J. Tennant, M. D.*	15	4	2	4	5	---	---	---	---	---	---	---	---
Charlotte, *A. R. Stealy, M. D.*	26	4	3	3	4	2	3	---	3	---	4	---	---
Durand, *A. G. Cowles, M. D.*	50	3	4	4	5	4	4	5	4	5	4	4	4
Elsie, *Earl Bigham, M. D.*	10	---	---	---	---	---	---	---	---	5	3	2	---
Fowler, *Harley A. Stroud, M. D.*	11	4	4	3	---	---	---	---	---	---	---	---	---
Fowler, *Geo. C. Havens, M. D.*	27	---	---	---	---	---	---	5	4	5	4	4	5
Hastings, *F. R. Timmerman, M. D.*	12	4	4	4	---	---	---	---	---	---	---	---	---
Hastings, *D. E. Fuller, M. D.*	19	---	---	3	5	3	4	4	---	---	---	---	---
Howell, J. A. Wessinger, M. D.	26	4	2	3	5	4	4	4	---	---	---	---	---
Howell, O. N. Moon, M. D.	16	---	---	---	---	---	---	---	4	3	2	2	5
Howard City, *John J. Austin, M. D.*	16	---	---	---	---	---	---	---	---	4	4	3	5
Hubbardston, *H. W. Browne, M. D.*	50	3	4	4	4	4	4	5	4	5	4	4	5
Lakeview, *A. H. Forsyth, M. D.*	40	---	---	---	5	4	4	5	4	5	4	4	5
Linden, *H. H. Chase, M. D.*	42	3	4	2	4	---	3	5	3	5	4	4	5
Lyons, *B. M. Hutchinson, M D.*	51	3	4	4	5	4	4	5	4	5	4	4	5
Ovid, *J. E. Taylor, M. D.*	18	---	---	---	---	---	---	---	---	5	4	4	5
Palo, F. A. Hargrave, M. D.	42	2	---	3	5	4	3	4	3	5	4	4	5
Potterville, *L. E. Higbee, M. D.*	25	3	3	3	5	2	3	---	2	4	---	---	---
Sheridan, *W. H. Budd, M. D.*	39	4	2	4	4	4	3	---	2	3	4	4	5
Stanton, W. P. Gamber, M. D.	50	4	4	4	5	4	4	5	4	5	4	4	3
Stockbridge, *Geo. A. Rowe, M. D.*	33	---	---	---	---	4	4	5	3	5	4	3	5
Westphalia, *F. W. Martin, M. D.*	44	3	2	4	5	2	2	5	3	5	4	4	5
Southwestern Division *	504	39	36	36	39	48	47	54	39	48	40	38	40
Allegan, *L. F. Stuck, M D.*	11	---	---	---	---	---	---	---	---	5	4	2	---
Berrien Springs, *W. F. Bullard, M. D.*	52	4	4	4	5	4	4	5	4	5	4	4	5
Benton Harbor, *F. W. Kerry, M. D.*	30	4	4	4	5	4	4	5	---	---	---	---	---
Benton Harbor, *H. V. Tutton, M. D.*	10	---	---	---	---	---	---	---	3	4	3	---	---
Buchanan, *M. M. Knight, M. D.*	39	4	4	4	4	4	4	4	2	4	3	2	---
Decatur, *G. W. Mahoney, M. D.*	52	4	4	4	5	4	4	5	4	5	4	4	5
Dowagiac, C. W. Morse, M. D.	19	3	---	---	---	4	4	5	3	---	---	---	---
Fennville, *Geo. W. Forest, M. D.*	35	---	---	---	---	4	4	5	4	5	4	4	5
Hartford, *H. C. Maynard, M. D.*	51	4	4	4	5	4	4	5	4	5	3	4	5
Lawton, *I. E. Hamilton, M. D.*	9	---	---	---	---	4	3	---	---	---	---	2	---
Niles, *O. P. Horn, M. D.*	52	4	4	4	5	4	4	5	4	5	4	4	5
Otsego, *M. Chase, M. D.*	46	4	4	4	5	4	4	5	3	---	4	4	5
Saugatuck, *H. M. Stimson, M. D.*	52	4	4	4	5	4	4	5	4	5	4	4	5
South Haven, *W. G. Triece. M. D.*	12	4	4	4	---	---	---	---	---	---	---	---	---
South Haven, *W. C. Ransom, M. D.*	34	---	---	---	---	4	4	5	4	5	3	4	5
Southern Central Division *	858	67	64	67	74	58	49	60	62	93	86	82	96
Albion, *A. G. Bruce, M. D.*	18	---	4	4	3	---	---	---	---	---	---	3	4
Burr Oak, *J. C. Rollman, M. D.*	52	4	4	4	5	4	4	5	4	5	4	4	5
Burr Oak, *C. D. Parsons, M. D.*	20	4	4	4	5	3	---	---	---	---	---	---	---
Bronson, *S. M. Cornell, M. D.*	35	---	---	---	---	4	4	5	4	5	4	4	5
Coldwater, *L. A. Warsabo, M. D.*	26	3	3	4	5	4	---	3	4	---	---	---	---
Coldwater, *W. L. Ford, M. D.*	18	---	---	---	---	---	---	---	---	5	4	4	5
Concord, *W. N. Keeler, M. D.*	45	4	4	4	5	---	2	5	3	5	4	4	5
Clayton, *E. J. C. Ellis, M. D.*	33	4	3	3	4	---	---	---	4	4	3	4	4
Clinton, *Jno. E. White, M. D.*	9	4	3	---	---	---	---	---	---	---	2	---	---
Centreville, *L. H. D. Pierce, M. D.*	13	---	---	---	---	---	---	---	---	---	4	4	5
Constantine, *Daniel E. Thomas, M. D.*	18	---	---	---	---	---	---	---	---	5	4	4	5
Chelsea, *Geo. W. Palmer, M. D.*	19	---	---	---	---	---	2	5	4	5	3	---	---
Deerfield, *Webster Bliss, M. D.*	47	3	3	4	5	3	3	5	4	4	4	4	5
Galesburg, *O. F. Burroughs, M. D.*	21	4	---	---	---	---	---	---	---	5	4	4	4
Jonesville, *H. W. Warren, M. D.*	10	3	4	3	---	---	---	---	---	---	---	---	---
Jonesville, *Malcom Graham, M. D.*	10	---	---	---	---	4	4	---	2	---	---	---	---
Kalamazoo, *H. H. Schaberg, M. D.*	49	4	4	4	5	4	4	3	3	5	4	4	5
Kalamazoo, W. B. Southerd, M. D.	52	4	4	4	5	4	4	5	4	5	4	4	5
Kalamazoo, *C. VanZwaluwenburg, M. D.*	38	---	---	---	3	4	4	5	4	5	4	4	5
Litchfield, *Geo. Martin, M. D.*	52	4	4	4	5	4	4	5	4	5	4	4	5
Mendon, H. C. Clapp, M. D.	38	4	---	3	5	4	---	---	4	5	4	4	5
Mendon, *Edwin Stewart, M. D.*	21	2	4	3	5	4	3	---	---	---	---	---	---
Manchester, *E. M, Conklin, M. D.*	26	---	---	---	---	---	---	4	4	5	4	4	5
Parma, *E. V. Riker, M. D.*	18	---	---	---	---	---	---	---	---	---	4	4	5
Richland, *J. M. Rankin, M. D.*	52	4	4	4	5	4	4	5	4	5	4	4	5
Sturgis, *S. B. Follett, M. D.*	12	4	4	4	---	---	---	---	---	---	---	---	---
Sturgis, *D. V. Runyan, M. D.*	17	---	---	---	---	2	3	---	---	---	4	4	4
Tecumseh, J. F. Jenkins, M. D.	50	4	4	3	5	4	4	5	3	5	4	4	5
Union City, *E. Brumfield, M. D.*	18	4	4	4	4	2	---	---	---	---	---	---	---
Vicksburg, *C. H. McKain, M. D.*	14	---	---	4	---	---	---	---	3	5	2	---	---
Ypsilanti, *D. A. Post, M. D.*	12	---	---	---	---	---	---	---	---	5	4	3	---

EXHIBIT V.—CONTINUED.

Divisions and localities represented and physicians who reported. (Health Officers in Italics.)	Weekly Reports in 1891.—Compiled in this Article.												
	Year, 1891.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Southeastern Division *	745	56	58	56	63	58	62	73	59	77	59	59	65
Armada, S. T. Beardslee, M. D.	52	4	4	4	5	4	4	5	4	5	4	4	5
Armada, *C. H. Lincoln, M. D.*	36	4	4	4	5	4	4	5	3	3	...	...	...
Detroit, H. R. Hitchcock, M. D.	41	4	2	3	5	3	4	5	2	4	3	2	4
Farmington, *J. J. Moore, M. D.*	40	2	4	4	...	...	4	5	4	5	4	4	4
Farmington, *Thos. H. Turner, M. D.*	23	...	...	...	...	3	...	3	...	4	4	4	5
Grosse Point, *Geo. I. Dakin, M. D.*	18	...	...	...	...	...	4	5	4	5	...	...	...
Holly, *L. E. Wickens, M. D.*	15	4	4	4	3	...	...	...	...	...	...	...	...
Highland Park, *A. Stewart, M. D.*	49	4	4	4	5	4	4	5	3	3	4	4	5
Memphis, *D. H. Cole, M. D.*	50	3	4	4	5	4	4	5	4	5	4	4	4
Monroe, *A. J. Masecar, M. D.*	19	...	...	...	...	...	...	...	2	5	3	4	5
New Haven, *Alex. Gunn, M. D.*	52	4	4	4	5	4	4	5	4	5	4	4	5
Northville, *J. M. Swift, M. D.*	21	4	4	4	5	4	...	...	...	...	...	...	...
Northville. *J. M. Burgess. M. D.*	11	...	...	...	...	...	...	...	...	...	3	4	4
Oxford, *John J. Travis, M. D.*	17	...	...	...	...	4	2	3	3	5	...	...	...
Plymouth, J. M. Collier, M. D.	24	4	4	3	5	2	3	...	3	...	...	...	...
Plymouth, *J. E. Bennett. M. D.*	15	...	...	...	...	3	2	...	...	...	4	2	4
Pontiac, *N. B. Colvin, M. D.*	23	...	...	...	...	...	4	5	4	4	2	4	...
Romeo, *Wm. Greenshields, M. D.*	10	4	4	2	...	...	...	...	...	...	...	...	...
Romeo, *J. B. Fares, M. D.*	52	4	4	4	5	4	4	5	4	5	4	4	5
Rochester, *H. P. Ewell. M D.*	33	4	4	4	5	4	4	5	3	...	...	...	...
Royal Oak, *Henry K. Lathrop, M. D.*	12	...	...	...	...	...	...	...	...	5	4	3	...
Trenton, *Hiram Holden, M. D.*	34	...	...	...	...	4	4	4	4	5	4	4	5
Wayne, *H. E. Foster. M. D.*	50	4	4	4	5	4	4	4	4	4	4	4	5
Wyandotte, E. P. Christian, M. D.	48	3	4	4	5	3	3	4	4	5	4	4	5

* For counties in each division see Exhibit I, page 85.

[Foot-notes from page 95.]

† The numbers opposite the names of the diseases do not state what per cent of the whole number of observers for the year reported the disease present at some time during the year, but state (on an average for the 12 months of the year) by what per cent of the observers making reports for the several months, the disease was reported present in those months. The column for each year is thus a statement for an average month of that year. On the two following pages of this table, however, the columns for each month state what per cent of the observers for that month (the number of whom is stated at the foot of the column) reported the given disease in that month.

[Foot-note from pages 89, 90 and 91.]

‡ Consumption, remittent fever and typho-malarial fever were not printed on the first blanks used in making weekly reports (beginning with the month of September, 1876); neuralgia and tonsillitis were not printed on any blanks used prior to October, 1878, and not on all used for several months after that date; inflammation of brain and inflammation of bowels were not printed on any blanks used prior to July, 1879, and not on all used for several months after that date; inflammation of kidney was not printed on any of the cards used prior to October, 1888, and not on all used for several months after that date; pleuritis was not printed on any cards used prior to 1888: hence it is probable that these diseases were not so fully reported at first as were the other diseases.

TABLE 1.—*Stating, for each of the Thirteen Years 1879–1891, and the Average for 1877–1890, also the Average for the period of five years, 1886–1890, by what Per Cent of Observers each of 28 Diseases was reported present in those years, (also the Average Number of Observers per Month and the Total Observers for each Year).—Compiled from Weekly Reports of Health Officers of Cities and Villages and from Regular Correspondents of the State Board of Health.*—Diseases arranged in order of Greatest Number of Observers reporting them present in 1891.*—*(Continued, for each month of 1890 and 1891, on pages 96–97.)*

Line Number.	Diseases.	Observers by whom the Several Diseases were Reported Present.—Average Per Cents (per Month) of those making Reports.†														
		Av. 1877-90.	Av. 1886-90.	1891.	1890.	1889.	1888.	1887.	1886.	1885.	1884.	1883.	1882.	1881.	1880.	1879.
	Av. for tabulated diseases reported present	40	36	37	37	36	35	37	37	38	42	43	43	45	43	44
1	Rheumatism	83	84	86	87	82	82	82	85	83	83	83	85	84	85	85
2	Neuralgia ‡	82	82	83	85	82	79	83	83	83	84	85	85	78	79	75
3	Bronchitis	75	74	75	81	75	74	69	71	70	74	79	80	74	77	75
4	Tonsillitis ‡	70	70	74	75	71	64	68	70	72	78	73	72	65	67	68
5	Influenza	53	51	69	67	49	46	46	48	47	53	56	55	48	54	57
6	Diarrhea	65	64	67	68	65	60	65	64	66	71	67	69	67	63	65
7	Consumption, Pul.‡	68	60	60	62	59	57	60	64	68	72	71	74	78	76	78
8	Intermittent Fever	77	63	52	58	61	59	64	71	73	79	82	83	90	90	90
9	Pneumonia	53	48	45	50	47	49	46	48	44	48	59	61	60	62	60
10	Remittent Fever	57	46	43	40	45	49	46	48	52	60	57	64	66	67	69
11	Erysipelas	43	43	39	43	43	44	44	43	44	48	47	42	42	45	43
12	Inflam. of Kidney ‡	35	34	36	36	35	33	32	35	34	41	-----	-----	-----	-----	-----
13	Pleuritis ‡	-----	33	36	35	33	32	-----	-----	-----	-----	-----	-----	-----	-----	-----
14	Inflam. of bowels ‡	29	30	31	29	29	30	32	32	32	30	31	28	26	25	-----
15	Cholera morbus	31	29	31	29	27	29	33	29	33	37	32	31	41	34	34
16	Dysentery	32	31	30	31	33	30	33	30	28	38	35	31	34	30	31
17	Cholera infantum	22	22	23	21	21	20	24	25	21	26	24	22	27	23	23
18	Scarlet Fever	26	18	17	18	18	17	15	20	22	29	32	32	32	26	36
19	Measles	20	18	17	22	12	25	22	10	9	17	37	20	37	30	18
20	Typhoid Fev. (enteric)	19	15	16	14	17	16	15	15	16	20	19	24	26	21	18
21	Whooping-cough	26	22	16	17	25	16	24	28	21	29	23	26	24	42	31
22	Diphtheria	30	17	13	16	12	14	18	24	27	27	31	43	51	43	45
23	Typho-malarial Fever	31	24	12	14	26	25	26	27	27	32	32	39	43	37	32
24	Inflammation of brain‡	13	13	11	12	13	13	15	13	14	14	12	12	12	13	-----
25	Membranous Croup	13	10	10	11	7	10	10	12	10	14	14	15	19	13	16
26	Puerperal Fever	12	12	8	9	13	12	14	12	13	16	15	18	12	8	8
27	Cerebro-spinal Men.	9	7	6	8	7	7	7	8	12	12	11	12	16	6	5
28	Small-pox	1.4	.26	0	0.2	0.5	.07	.01	0.5	0.4	0.2	1	5	4	1	1
	No. of Observers	137	152	145	155	139	142	155	169	163	142	140	159	116	112	110
	Av. No. of Observers per month	89	106	91	102	100	102	114	113	104	79	88	93	70	79	73

* For 1891, the number of obsevers, reports, weeks in each month, etc., are stated in the first five columns of Exhibit III., page 88, the names of the observers and the number of the reports received from each are stated in Exhibit V., pages 92, 93 and 94.

† ‡ Foot-notes are on the preceding page.

TABLE 1.—CONTINUED.—[a]*Per Cent of Observers by whom the Several Diseases were months, for the period of five years, 1886-1890, and for the period of fourteen*

Per Cent of Observers by whom the Diseases were Reported Present. ‡

Line Number.	January.* Diseases.	Av. '77-'90.	Av. '86-'90.	1891.	1890.	February.* Diseases.	Av. '77-'90.	Av. '86-'90.	1891.	1890.	March.* Diseases.	Av. '77-'90.	Av. '86-'90.	1891.	1890.
	Average †	40	37	38	39	Average †	39	36	37	36	Average †	40	38	38	36
1	Rheumatism	87	85	90	91	Bronchitis	86	84	91	88	Influenza	71	73	98	96
2	Neuralgia	84	83	89	84	Rheumatism	85	83	91	85	Bronchitis	86	84	90	90
3	Bronchitis	85	80	88	84	Influenza	71	70	87	99	Neuralgia	87	87	89	88
4	Influenza	69	66	86	99	Neuralgia	84	83	86	85	Rheumatism	85	85	85	86
5	Tonsillitis	80	79	80	84	Tonsillitis	78	77	83	75	Tonsillitis	79	79	83	78
6	Consumption, Pul.	69	63	68	66	Pneumonia	79	74	71	86	Consumption, Pul.	72	65	66	61
7	Pneumonia	77	70	68	86	Consumption, Pul.	70	63	62	60	Pneumonia	77	71	65	64
8	Diarrhea	46	48	52	55	Erysipelas	45	45	47	45	Diarrhea	48	49	55	53
9	Intermittent Fever	68	56	51	52	Intermittent Fever	68	55	46	48	Intermittent Fever	71	57	48	46
10	Pleuritis	—	45	45	51	Diarrhea	45	47	45	50	Erysipelas	46	46	48	43
11	Remittent Fever	51	41	44	32	Pleuritis	—	43	45	42	Pleuritis	—	45	42	50
12	Erysipelas	47	46	41	43	Remittent Fever	55	38	40	24	Remittent Fever	51	41	36	30
13	Inflam. of Kidney	35	33	30	31	Inflam. of Kidney	39	37	37	35	Measles	27	27	33	31
14	Scarlet Fever	33	23	24	18	Inflam. of Bowels	26	27	25	27	Inflam. of Kidney	40	39	30	40
15	Inflam. of Bowels	26	28	23	23	Measles	21	21	20	29	Inflam. of Brain	14	15	22	14
16	Diphtheria	37	22	18	20	Inflam. of Brain	14	15	17	12	Membranous Croup	16	11	20	9
17	Measles	18	17	18	18	Scarlet Fever	32	19	17	14	Scarlet Fever	33	20	19	17
18	Membran. Croup	22	15	17	13	Membran. Croup	17	11	15	10	Inflam. of Bowels	28	28	19	24
19	Dysentery	16	16	13	14	Dysentery	12	13	13	13	Whooping-cough	25	22	13	19
20	Puerperal Fever	13	12	11	13	Diphtheria	32	18	13	17	Cholera Morbus	12	8	11	7
21	Cholera Morbus	10	8	10	5	Cholera Morbus	10	7	10	9	Typho-mal. Fever	20	15	9	3
22	Typho-mal. Fever	26	19	10	13	Cerebro-spi. Men.	9	9	9	11	Diphtheria	30	17	8	12
23	Whooping-cough	26	20	9	19	Typho-mal. Fever	22	15	9	4	Dysentery	15	15	8	11
24	Inflam. of Brain	13	15	9	14	Puerperal Fever	12	12	8	10	Puerperal Fever	15	15	7	9
25	Typhoid Fev. (ent.)	17	12	8	14	Whooping-cough	25	21	8	22	Cerebro-spi. Men.	11	12	6	14
26	Cerebro-spi. Men.	7	7	6	9	Typhoid Fev. (ent.)	13	9	7	3	Typhoid Fev. (ent.)	10	7	3	3
27	Cholera Infantum	5	4	6	5	Cholera Infantum	4	3	5	1	Cholera Infantum	5	4	1	3
28	Small-pox	2	0.6	0	0	Small-pox	2	0.6	0	1	Small-pox	1	0.4	0	1
	Observers §	85	98	88	88	Observers §	85	97	87	92	Observers §	84	96	88	90

Line Number.	April.* Diseases.	Av. '77-'90.	Av. '86-'90.	1891.	1890.	May.* Diseases.	Av. '77-'90.	Av. '86-'90.	1891.	1890.	June.* Diseases.	Av. '77-'90.	Av. '86-'90.	1891.	1890.
	Average †	40	37	40	40	Average †	39	37	37	37	Average †	38	35	33	35
1	Influenza	64	65	100	77	Influenza	54	53	90	62	Rheumatism	84	85	81	87
2	Rheumatism	88	88	92	89	Neuralgia	83	83	87	85	Neuralgia	80	80	80	82
3	Bronchitis	83	81	90	90	Rheumatism	86	86	87	92	Bronchitis	70	71	65	70
4	Tonsillitis	75	75	88	81	Tonsillitis	71	70	84	75	Tonsillitis	64	63	64	66
5	Neuralgia	86	86	87	92	Bronchitis	78	77	80	82	Influenza	40	39	59	41
6	Pneumonia	73	65	77	72	Consumption, Pul.	72	64	62	69	Diarrhea	65	66	58	69
7	Consumption, Pul.	72	65	73	75	Diarrhea	55	53	58	52	Consumption, Pul.	68	62	57	62
8	Pleuritis	—	42	58	43	Pneumonia	62	56	58	53	Intermittent Fever	81	66	48	59
9	Diarrhea	50	49	53	56	Erysipelas	48	47	46	40	Erysipelas	43	45	37	48
10	Intermittent Fever	76	62	52	62	Intermittent Fever	81	65	45	60	Cholera Morbus	37	31	34	25
11	Measles	33	30	44	39	Pleuritis	—	32	43	36	Inflam. of Kidney	38	38	34	35
12	Remittent Fever	54	42	43	35	Inflam. of Kidney	38	38	42	42	Remittent Fever	56	43	33	36
13	Erysipelas	48	50	38	48	Remittent Fever	56	45	33	41	Pleuritis	—	30	32	27
14	Inflam. of Kidney	40	39	36	51	Measles	37	34	31	35	Inflam. of Bowels	29	28	31	28
15	Scarlet Fever	31	20	23	20	Inflam. of Bowels	29	31	27	29	Measles	31	29	27	37
16	Inflam. of Bowels	25	26	22	29	Dysentery	18	20	19	18	Pneumonia	42	37	25	30
17	Dysentery	15	13	17	14	Scarlet Fever	28	18	18	16	Dysentery	24	21	21	29
18	Whooping-cough	26	24	13	27	Cholera Morbus	19	17	16	9	Cholera Infantum	22	20	16	19
19	Cholera Morbus	13	10	12	8	Inflam. of Brain	13	13	11	13	Scarlet Fever	24	15	13	18
20	Membran. Croup	14	12	12	15	Puerperal Fever	13	13	10	14	Whooping-cough	26	24	12	19
21	Inflam. of Brain	15	14	10	13	Whooping-cough	28	27	9	25	Diphtheria	23	13	11	12
22	Diphtheria	28	13	10	10	Diphtheria	25	16	8	16	Puerperal Fever	12	12	10	10
23	Cerebro-spi. Men.	12	8	8	9	Cholera Infantum	9	10	5	9	Typhoid Fev. (ent.)	10	8	9	8
24	Puerperal Fever	12	14	8	13	Membranous Croup	11	10	5	10	Inflam. of Brain	13	15	5	14
25	Typhoid Fev. (ent.)	9	5	6	5	Cerebro-spi. Men.	10	9	4	11	Cerebro-spi. Men.	9	7	5	8
26	Typho-mal. Fever	20	18	6	13	Typhoid Fev. (ent.)	9	6	4	5	Typho-mal. Fever	20	15	4	6
27	Cholera Infantum	4	4	1	3	Typho-mal. Fever	20	18	4	14	Membranous Croup	8	6	3	9
28	Small-pox	2	0.2	0	0	Small-pox	2	0.2	0	0	Small-pox	2	0.2	0	0
	Observers §	78	89	77	79	Observers §	86	102	91	102	Observers §	88	105	91	106

* For 1891 the number of observers, reports, weeks in each month, etc., are stated in the first five col- stated in Exhibit V., pages 92-94. † The numbers in this line are an average, not for all diseases repre 94. § The numbers in this line state how many observers reported for the month in the given year. a For-

Reported Present by Months in each of the Years 1890–1891, and the Average by years, 1877–1890.

Per Cent of Observers by whom the Diseases were Reported Present. ‡

July.* Diseases.	Av. '77-'90.	Av. '86-'90.	1891.	1890.	August.* Diseases.	Av. '77-'90.	Av. '86-'90.	1891.	1890.	September.* Diseases.	Av. '77-'90.	Av. '86-'90.	1891.	1890.	Line number.
Average †	41	38	40	40	Average †	43	41	38	40	Average †	43	39	41	39	
Rheumatism	79	80	88	82	Diarrhea	96	95	96	95	Diarrhea	93	87	97	87	1
Neuralgia	79	80	86	82	Rheumatism	74	75	77	74	Rheumatism	77	79	88	83	2
Diarrhea	90	89	86	92	Cholera Morbus	77	76	76	77	Neuralgia	76	79	79	83	3
Intermittent Fever	82	67	70	65	Neuralgia	76	78	73	80	Bronchitis	63	63	70	72	4
Tonsillitis	55	54	69	68	Dysentery	75	73	64	64	Dysentery	70	66	69	65	5
Bronchitis	60	61	65	72	Cholera Infantum	67	67	63	66	Cholera Infantum	57	54	66	49	6
Cholera Morbus	70	66	63	68	Intermittent Fever	83	68	59	63	Cholera Morbus	63	60	65	56	7
Consumption, Pul.	65	57	61	55	Consumption, Pul.	64	59	55	57	Tonsillitis	59	58	62	67	8
Cholera Infantum	49	50	54	45	Tonsillitis	55	56	53	63	Intermittent Fever	82	66	59	58	9
Remittent Fever	61	48	53	48	Remittent Fever	66	52	51	44	Consumption, Pul.	64	55	54	59	10
Influenza	30	27	51	35	Bronchitis	57	61	50	68	Remittent Fever	67	52	51	43	11
Dysentery	51	50	48	42	Inflam. of Bowels	37	39	39	45	Influenza	42	38	44	55	12
Inflam. of Kidney	34	33	40	37	Inflam. of Kidney	30	30	33	30	Inflam. of Bowels	32	33	42	33	13
Erysipelas	40	38	35	43	Erysipelas	36	38	32	35	Inflam. of Kidney	27	26	38	28	14
Inflam. of Bowels	34	35	34	31	Influenza	33	29	29	38	Erysipelas	33	36	34	37	15
Pleuritis	...	24	24	25	Whooping-cough	29	25	24	18	Typhoid Fev. (ent.)	30	29	32	26	16
Whooping-cough	30	27	21	23	Typhoid Fev. (ent.)	23	24	21	25	Pleuritis	...	22	27	24	17
Measles	23	19	20	30	Pneumonia	25	23	17	21	Whooping-cough	27	23	24	11	18
Pneumonia	30	25	19	32	Typho-mal. Fever	38	32	14	23	Scarlet Fever	19	12	21	12	19
Inflam. of Brain	13	13	16	14	Pleuritis	...	21	14	22	Pneumonia	30	27	18	25	20
Diphtheria	23	11	15	14	Scarlet Fever	18	11	14	13	Typho-mal. Fever	52	41	16	24	21
Typhoid Fev. (ent.)	13	13	13	13	Measles	12	10	10	12	Diphtheria	27	16	13	14	22
Scarlet Fever	20	12	13	16	Diphtheria	24	13	9	10	Inflam. of Brain	12	11	10	8	23
Cerebro-spi. Men.	8	8	9	8	Inflam. of Brain	15	14	8	13	Cerebro-spi. Men.	9	6	10	6	24
Typho-mal. Fever	25	19	9	14	Cerebro-spi. Men.	9	8	3	6	Puerperal Fever	10	10	9	4	25
Puerperal Fever	11	11	5	12	Puerperal Fever	11	10	2	3	Measles	8	7	4	7	26
Membran. Croup	4	4	4	6	Membranous Croup	5	5	0	6	Membranous Croup	8	6	3	7	27
Small-pox	2	0.2	0	0	Small-pox	1	0.16	0	0	Small-pox	1	0.4	0	0	28
Observers §	92	110	80	108	Observers §	95	113	92	115	Observers §	93	113	98	123	

October.* Diseases.	Av. '77-'90.	Av. '86-'90.	1891.	1890.	November.* Diseases.	Av. '77-'90.	Av. '86-'90.	1891.	1890.	December.* Diseases.	Av. '77-'90.	Av. '86-'90.	1891.	1890.	Line number.
Average †	43	39	37	40	Average †	39	36	35	37	Average †	39	36	37	41	
Diarrhea	77	74	89	82	Neuralgia	83	83	83	85	Influenza	62	62	96	84	1
Rheumatism	84	86	88	89	Rheumatism	85	86	81	92	Rheumatism	86	86	90	95	2
Neuralgia	81	83	78	88	Bronchitis	79	77	72	87	Neuralgia	84	84	83	87	3
Tonsillitis	70	72	70	82	Tonsillitis	77	77	72	80	Tonsillitis	80	79	83	84	4
Bronchitis	79	73	66	84	Diarrhea	56	56	58	58	Bronchitis	83	81	81	93	5
Intermittent Fev.	81	67	56	63	Influenza	55	54	57	73	Pneumonia	64	57	67	71	6
Remittent Fever	66	53	53	49	Consumption, Pul.	68	58	55	56	Consumption, Pul.	68	61	56	65	7
Consumption, Pul.	69	59	50	65	Intermittent Fever	75	60	50	58	Diarrhea	47	49	50	57	8
Dysentery	44	39	45	39	Remittent Fever	58	46	43	49	Erysipelas	43	45	43	48	9
Influenza	48	49	42	69	Pleuritis	...	31	39	32	Intermittent Fever	70	56	41	58	10
Cholera Morbus	31	27	38	27	Erysipelas	42	45	38	40	Inflam. of Kidney	35	34	40	38	11
Inflam. of Bowels	30	30	35	26	Pneumonia	53	46	37	45	Pleuritis	...	43	40	55	12
Typhoid Fev. (ent.)	33	29	35	27	Inflam. of Kidney	33	32	37	37	Remittent Fever	54	44	36	46	13
Inflam. of Kidney	35	33	33	35	Inflam. of Bowels	26	25	35	20	Inflam. of Bowels	29	31	34	31	14
Typho-mal. Fever	54	41	32	24	Typhoid Fev. (ent.)	29	23	31	19	Dysentery	15	16	21	20	15
Cholera Infantum	25	21	31	20	Dysentery	23	22	23	21	Typhoid Fev. (ent.)	21	16	20	14	16
Pleuritis	...	29	31	29	Whooping-cough	23	17	22	10	Membranous Croup	20	16	19	22	17
Pneumonia	40	37	30	40	Diphtheria	37	22	17	22	Diphtheria	37	20	19	22	18
Erysipelas	41	44	28	46	Cholera Morbus	15	13	16	16	Scarlet Fever	29	23	19	24	19
Scarlet Fever	24	19	17	23	Typho-mal. Fever	40	27	14	15	Whooping-cough	23	16	16	10	20
Diphtheria	36	21	17	19	Membranous Croup	18	14	11	15	Cholera Morbus	12	11	12	15	21
Whooping-cough	24	19	16	7	Scarlet Fever	25	18	11	21	Inflam. of Brain	12	14	9	13	22
Inflam. of Brain	11	12	7	14	Inflam. of Brain	11	11	9	10	Cholera Infantum	5	6	9	8	23
Puerperal Fever	12	12	6	9	Cholera Infantum	10	8	9	8	Puerperal Fever	11	12	9	12	24
Cerebro-spi. Men.	8	6	4	6	Puerperal Fever	11	11	6	7	Cerebro-spi. Men.	7	6	7	9	25
Membran. Croup	14	14	3	15	Cerebro-spi. Men.	7	6	4	6	Typho-mal. Fever	31	20	6	13	26
Measles	8	9	2	8	Measles	10	10	4	6	Measles	14	13	3	17	27
Small-pox	1	0.2	0	0	Small-pox	1	0.8	0	0	Small-pox	2	0.8	0	0	28
Observers §	92	108	103	109	Observers §	90	107	101	113	Observers §	89	103	90	101	

umns of Exhibit III., page 88, the names of observers and the number of reports received from each are sented, but only for those reported present in the given month. ‡ See foot-note with this mark on page first part of Table 1, and full heading, see page 95.

TABLE 2.—WEEKLY REPORTS OF DISEASES IN MICHIGAN IN 1891.—*Exhibiting for the Year and for each Month of the Year Ending Saturday, January 2, 1892, a Summary relative to diseases in the State of Michigan; also for each Month a Summary relative to Diseases in each of 11 Geographical Divisions* of the State.—Indicating the prevalence as regards Time and Area. Compiled from 4,291 Weekly Reports by 145 Observers, Health Officers of Cities and Villages, Regular Correspondents of the State Board of Health, and other Physicians, Reporting the Diseases under their observation.*

Number of Observers, Reports, etc.	Diseases.	(Av. b) Per Cent of Observers reporting Presence of.	Average Per cent of Weeks Reported Present where Present. c	Per cent of Reports Stating Presence of. d	Average Order of Prevalence Where Present. e	Average Order of Prevalence where Present.												
						1890.	1889.	1888.	1887.	1886.	1885.	1884.	1883.	1882.	1881.	1880.	1879.	Av. 1877-1890.	Av. 1886-1890.
Year Ending January 2, 1892.† Average number of localities represented 126. Whole number of Observers during the year, 145. Average per month, 91. Total number of reports compiled, 4,291.[a] Whole number per month, 358.	Average for tabulated diseases reported present.	37	66	25	3.3	3.3	3.3	3.5	3.7	3.7	3.8	4.2	4.2	4.2	4.9	4.7	4.7	4.1	3.5
	Brain, Inflammation of	11	37	4	4.9	5.4	4.8	6.4	6.2	5.9	6.0	6.4	6.6	6.6	8.7	8.1	.....	.....	5.7
	Bowels, Inflammation of	31	47	15	4.3	4.4	4.1	4.6	5.0	5.0	5.1	5.8	6.1	6.0	7.4	7.0	.....	.....	4.6
	Bronchitis	75	79	60	2.7	2.6	2.7	2.7	3.0	3.0	3.1	3.2	3.2	3.3	3.9	3.7	3.6	3.1	2.8
	Cerebro-Spinal Meningitis	6	39	3	5.3	4.7	4.2	4.6	7.8	7.3	6.9	6.9	7.4	7.2	7.9	7.1	7.4	6.5	5.7
	Cholera Infantum	23	54	13	3.6	3.5	3.4	4.0	4.1	3.9	4.6	4.8	4.8	4.9	5.1	5.2	5.4	4.6	3.8
	Cholera Morbus	31	52	16	3.4	3.5	3.4	3.7	3.8	4.2	4.5	4.9	5.0	5.2	5.3	5.3	5.3	4.6	3.7
	Consumption, Pulmonary	60	81	49	3.8	3.5	3.5	3.6	3.7	3.9	4.0	4.3	4.5	4.6	5.6	5.7	5.6	4.5	3.6
	Croup, Membranous	10	41	4	4.4	4.6	4.3	5.1	6.8	6.2	6.1	7.1	7.1	7.0	8.2	7.4	6.6	6.4	5.4
	Diphtheria	13	42	6	4.4	4.2	4.3	4.8	4.4	4.2	4.7	5.1	5.4	4.8	5.6	5.7	5.4	5.0	4.4
	Diarrhea	67	69	47	2.7	2.9	2.8	3.0	3.0	3.2	3.3	3.3	3.7	3.8	3.9	4.2	4.4	3.5	3.0
	Dysentery	30	52	16	3.8	3.8	3.7	3.8	4.3	4.5	5.0	5.0	5.2	5.3	5.1	5.8	6.2	4.9	4.0
	Erysipelas	39	49	19	4.2	4.1	4.1	4.4	4.7	4.5	4.6	5.2	5.5	5.5	6.2	6.3	6.5	5.3	4.4
	Fever, Intermittent	52	68	36	3.2	2.9	2.6	2.6	2.8	2.6	2.4	2.5	2.3	2.0	2.4	2.3	2.2	2.4	2.7
	Fever, Remittent	43	64	28	3.3	3.2	3.2	3.1	3.4	3.3	3.2	3.3	3.3	3.3	3.5	3.3	3.3	3.3	3.2
	Fever, Typhoid (Enteric)	16	66	11	3.5	3.8	3.9	4.2	4.5	4.7	4.7	5.2	5.1	5.1	6.2	6.5	7.0	5.2	4.2
	Fever, Typho-malarial	12	49	6	3.6	3.6	3.9	3.6	4.1	4.2	4.4	4.6	4.8	4.9	5.2	5.5	5.8	4.6	3.9

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For the	Whole number of localities sented per month, 86. age number of observers Average No. of Reports																		
		Influenza	69	79	55	2.0	2.2	2.4	2.7	3.0	2.7	2.9	3.3	3.2	3.1	3.5	3.0	3.1	2.9	2.6
		Kidney, Inflammation of	36	56	20	3.9	4.1	4.1	4.5	4.9	4.7	4.4	5.0	-----	-----	-----	-----	-----	-----	4.5
		Measles	17	59	10	3.0	3.0	3.5	3.2	3.6	5.0	6.4	5.2	3.7	4.9	4.4	4.8	4.7	4.5	3.7
		Neuralgia	83	78	66	2.8	2.7	2.6	2.7	2 8	2.8	2.8	3.3	3.3	3.6	4.3	4.5	4.5	3.3	2.7
		Pleuritis	36	56	21	4.1	4.2	4.0	4.4	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
		Pneumonia	45	58	27	4.0	3.9	3.7	4.0	4.3	4.0	4.4	4.5	4.7	4.4	5.4	5.1	5.2	4.5	4.0
		Puerperal Fever	8	35	3	4.5	4.5	3.4	4.6	5.7	5.9	6.3	6.9	7.3	6.2	8.2	7.8	7.2	6.2	4.8
		Rheumatism	86	79	69	2.9	2.9	2.8	3.0	3.2	3.2	3.2	3.6	3.7	3.8	4.6	4.6	4.6	3.7	3.0
		Scarlatina	17	52	9	4.2	4.2	3.9	4.6	5.0	4.5	5.0	5.2	5.2	4.9	6.7	6.5	5.5	5.1	4.4
		Small-pox	0	0	0	0	6.5	11.0	15.3	26.0	25.9	8.4	26.0	14.0	9.1	8.9	6.3	10.6	12.8	16.9
		Tonsillitis	74	66	49	3.3	3.4	3.3	3.4	3.4	3.4	3.5	3.7	3.9	3.9	4.5	4.4	4.5	3.8	3.4
		Whooping-cough	16	55	9	2.9	3.2	3.3	3.9	4.2	3.7	4.1	4.5	5.2	4.4	6.3	5.5	4.7	4.5	3.7

* **For counties in each Division, see Exhibit I., page 85.**

† For number of Observers, reports, weeks in each month, etc., see Exhibit III , page 88; for names of observers, and number of reports received from each, see Exhibit V., pages 92, 93 and 94.

a Not every one of the observers sent in a report for every week, so that the number of reports received does not equal the number of observers multiplied by the number of weeks.

b The numbers in this column (pages 98-99) state not what per cent of the whole number of observers for the year reported the disease present at some time during the year, but the average (for the twelve months) of the per cents (of observers making reports for the several months) by which the disease was reported present in those months. The column for the year is thus a statement for an average *month*. But on pages 100 and 101 the numbers in the "Per Cent of Observers" column are statements for the month, and not averages. This column indicates the Area of Prevalence except that in a few instances there were two or more observers in one city or village.

c This column states for the year or given month, what per cent the number of reports which stated a disease to be present is of the number of card-reports received, for the given time, from such of the observers as reported the diseases present. It is therefore an average, not for all localities represented, but only for those at which the given disease was reported present. In the line "Average for Tabulated Diseases" it states what per cent the number of times *all* diseases were reported present is of the number of times they *might have been* so reported on the cards received, for the time specified, from the observers who during that time reported the diseases present (that is, if each of the observers had on every card he sent reported every disease present which he reported present at all). It will be seen that this is a more accurate average than would be obtained by dividing the sum of the column by the number of diseases reported present.

d This column states what per cent the number of reports stating presence of a disease is of the whole number of reports received for the time specified, from *all observers* in the State or Division, as the case may be. It combines, and states in a general way, an idea of the *time* a disease was prevalent, with an idea of the area of its prevalence. Had every observer sent a report every week of the month or year, the numbers in this column would be (for the State) the product of the numbers in the same line in the two preceding columns.

e The disease having the greatest number of cases was to be marked 1 in the order; the disease having the next greatest number of cases, 2; and so on. Diseases not present were to be marked 0. The numbers in this column are found by dividing the totals (for the State) of the Order of Prevalence column, in Table 3 (a table giving statements for each locality, omitted in printing this Report, for want of room), by the number of men who reported the disease present. The column is, therefore, an average, not for all the localities represented, but only for those at which the given disease was reported present. The numbers in the "Average" lines for this column are found by dividing the sum of the totals in the Order of Prevalence columns, in Table 3, for all diseases reported present, by the sum of the numbers of men who reported the different diseases present, thus counting each man once for every disease he reported present. As a rule, small numbers in this column indicate a large prevalence of the disease, and *vice versa*; but the greater the number of diseases reported present by each observer from week to week, the greater will be the "average" in this column.

TABLE 2.—CONTINUED.—*Diseases in the State, 1891.* (*For foot-notes and full tabular heads, see pages 98-99.*)

Months. †	Diseases.	Per ct. of Observers Reporting Pres. of b	Av. Per ct. of Weeks Reported Present where present. a, c	Per cent of Reports stating Pres. of. d	Av. Order of Prevalence where Pres. e	Per ct. of Observers Reporting Pres. of b	Av. per ct. of Weeks Reported Present where Present. a, c	Per cent of Reports stating Pres. of. d	Av. Order of Prevalence where Pres. e	Per ct. of Observers Reporting Pres. of b	Av. per ct. of Weeks Reported Present where Present. a, c	Per cent of Reports stating Pres. of. d	Av. Order of Prevalence where Pres. e	Per ct. of Observers Reporting Pres. of b	Av. per ct. of Weeks Reported Present where Present. a, c	Per cent of Reports stating Pres. of. d	Av. Order of Prevalence where Pres. e	Per ct. of Observers Reporting Pres. of b	Av. per ct. of Weeks Reported Present where Present. a, c	Per cent of Reports stating Pres. of. d	Av. Order of Prevalence where Pres. e
January. †	Av. for Tab. Dis. Rep. Pres.	38	71	27	3.6	37	71	27	3.6	37	68	27	3.6	40	68	27	3.6	38	71	27	3.6
	Brain, Inflammation of	9	37	3	7.0	17	43	7	5.6	10	36	4	5.4	22	39	8	5.4	6	41	2	5.4
	Bowels, Inflammation of	23	46	10	4.2	25	51	13	5.2	22	51	12	5.2	19	46	9	4.6	13	48	15	4.7
	Bronchitis	88	91	81	2.4	91	87	79	2.5	90	90	76	2.6	90	85	81	2.6	90	86	64	2.6
	Cerebro-spinal Meningitis	6	33	2	4.2	9	48	4	6.3	6	53	3	6.0	8	33	2	6.0	5	47	3	6.0
	Cholera Infantum	6	39	2	6.2	5	30	2	4.3	1	25	0.8	9.0	1	20	0.8	9.0	1	25	2	9.0
	Cholera Morbus	10	41	4	4.3	10	33	4	4.4	11	45	5	8.8	12	40	5	4.6	10	45	6	4.2
	Consumption, Pulmonary	68	84	58	3.9	62	81	51	3.7	66	81	54	4.0	73	81	59	4.1	62	80	55	3.7
	Croup, Membranous	17	54	9	4.8	15	51	8	4.7	20	45	10	4.9	12	40	4	4.7	5	37	3	5.6
	Diphtheria	18	41	8	4.5	13	33	4	5.1	8	38	8	4.3	10	33	4	5.1	8	41	1	4.1
	Diarrhœa	52	60	31	3.9	45	59	27	4.1	55	56	31	3.7	58	56	30	4.0	58	64	38	3.2
	Dysentery	18	41	5	5.2	18	53	6	4.8	8	56	5	6.9	17	38	6	5.0	19	46	10	4.5
	Erysipelas	41	60	25	4.5	47	61	29	4.6	48	51	25	4.7	38	53	20	4.9	46	47	21	4.2
	Fever, Intermittent	51	68	36	3.7	46	69	33	3.7	48	66	33	4.0	52	64	33	3.9	45	75	34	3.5
	Fever, Remittent	44	67	31	3.7	40	67	28	4.1	36	69	26	4.5	43	60	25	4.5	33	60	23	3.5
	Fever, Typhoid (enteric)	8	71	5	4.6	7	75	5	4.2	3	78	2	3.3	6	85	2	5.8	4	60	3	4.8
	Fever, Typho-malarial	10	60	7	5.8	9	52	5	5.4	9	55	5	4.0	6	43	2	7.0	4	47	2	2.5
	Influenza	98	90	80	1.7	87	91	81	1.5	98	88	87	1.4	100	95	93	1.8	59	53	75	1.8
	Kidney, Inflammation of	30	64	19	4.6	37	53	20	4.8	30	63	19	4.6	30	58	21	4.1	34	60	25	4.1
	Measles	18	43	8	8.2	20	60	12	3.6	38	72	24	3.1	44	61	28	3.2	27	74	23	2.3
	Neuralgia	89	81	73	3.0	66	86	75	3.0	89	82	73	3.1	87	82	72	3.3	80	87	67	2.8
	Pleuritis	45	66	31	4.2	45	61	28	4.3	42	66	28	4.6	58	54	31	4.4	33	76	24	3.8
	Pneumonia	68	67	48	4.1	71	69	49	4.0	65	68	45	4.2	77	60	46	4.2	58	58	32	3.9
	Puerperal Fever	11	37	4	5.0	8	42	4	5.0	7	35	2	4.5	8	28	2	5.3	10	33	8	4.2
	Rheumatism	90	84	77	3.0	91	81	75	3.1	85	87	76	3.2	92	86	80	3.3	87	86	76	2.8
	Scarlatina	24	45	11	4.5	17	62	11	4.8	19	55	11	5.4	23	48	11	5.2	18	65	12	3.8
	Small-pox	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tonsillitis	80	76	61	3.5	83	76	63	3.4	83	73	61	3.7	88	69	61	3.7	84	60	51	3.3
	Whooping-cough	9	45	4	4.5	8	50	4	3.1	13	40	5	3.2	18	47	6	4.2	9	74	7	3.8
Months. †		Per ct. of Observers Reporting Pres. of b	Av. Per ct. of Weeks Reported Present where Present. a, c	Per cent of Reports stating Pres. of. d	Av. Order of Prevalence where Pres. e	Per ct. of Observers Reporting Pres. of b	Av. per ct. of Weeks Reported Present where Present. a, c	Per cent of Reports stating Pres. of. d	Av. Order of Prevalence where Pres. e	Per ct. of Observers Reporting Pres. of b	Av. per ct. of Weeks Reported Present where Present. a, c	Per cent of Reports stating Pres. of. d	Av. Order of Prevalence where Pres. e	Per ct. of Observers Reporting Pres. of b	Av. per ct. of Weeks Reported Present where Present. a, c	Per cent of Reports stating Pres. of. d	Av. Order of Prevalence where Pres. e	Per ct. of Observers Reporting Pres. of b	Av. per ct. of Weeks Reported Present where Present. a, c	Per cent of Reports stating Pres. of. d	Av. Order of Prevalence where Pres. e
		January. †				February. †				March. †				April. †				May. †			
Months. †		June. †																			
	Av. for Tab. Dis. Rep. Pres.	33	65	22	2.9																
	Brain, Inflammation of	5	41	2	3.4																
	Bowels, Inflammation of	31	48	15	3.7																
	Bronchitis	65	73	48	2.6																
	Cerebro-spinal Meningitis	5	47	3	4.0																
	Cholera Infantum	16	45	7	3.6																
	Cholera Morbus	34	43	15	3.6																
	Consumption, Pulmonary	57	80	46	3.4																
	Croup, Membranous	3	25	1	4.3																
	Diphtheria	11	41	5	3.3																
	Diarrhœa	58	64	38	2.6																
	Dysentery	21	46	10	3.5																
	Erysipelas	37	50	19	3.4																
	Fever, Intermittent	48	71	36	2.6																
	Fever, Remittent	38	62	21	2.8																
	Fever, Typhoid (enteric)	9	60	3	3.4																
	Fever, Typho-malarial	4	47	2	2.8																
	Influenza	59	72	44	2.2																
	Kidney, Inflammation of	34	58	21	3.4																
	Measles	27	64	18	2.4																
	Neuralgia	30	62	15	2.4																
	Pleuritis	22	55	15	3.7																
	Pneumonia	25	51	13	4.2																
	Puerperal Fever	10	46	5	2.9																
	Rheumatism	31	84	66	2.4																
	Scarlatina	13	55	7	2.8																
	Small-pox	0	0	0	0																
	Tonsillitis	64	62	41	3.0																
	Whooping-cough	12	59	7	2.2																

	July.†				August.†				September.†				October.†				November.†				December.†			
Av. for Tab. Dis. Rep. Pres.	40	58	23	3.1	38	66	26	3.3	41	61	25	3.1	37	65	24	3.1	35	65	28	3.0	37	63	24	3.4
Brain, Inflammation of	16	32	5	3.5	8	38	3	5.3	10	25	2	4.1	7	36	3	4.7	9	38	8	3.8	9	33	3	4.6
Bowels, Inflammation of	34	44	15	4.1	39	49	19	4.4	42	47	20	4.0	35	44	15	3.6	35	49	18	3.9	34	39	13	4.6
Bronchitis	65	67	43	3.1	50	70	36	3.6	70	64	44	3.1	66	73	48	2.8	72	78	57	2.5	81	88	68	2.5
Cerebro-spinal Meningitis	9	30	3	4.1	3	60	2	4.7	10	28	3	4.8	4	31	1	5.8	4	33	1	3.8	7	33	2	6.5
Cholera Infantum	54	50	27	3.9	63	68	43	3.2	66	62	41	3.2	31	45	14	3.8	9	34	3	4.3	9	28	3	3.4
Cholera Morbus	63	54	34	3.0	76	66	52	2.8	65	58	37	3.1	38	47	18	3.6	16	47	7	3.4	12	38	5	4.1
Consumption, Pulmonary	61	75	45	3.5	55	77	43	3.7	54	80	43	3.7	50	86	44	4.0	55	82	46	3.8	56	80	45	4.3
Croup, Membranous	4	21	1	2.7	0	0	0	0	3	23	1	3.0	3	33	1	6.3	11	46	5	4.5	19	33	6	5.3
Diphtheria	15	47	7	4.7	9	50	4	5.8	13	37	5	4.5	17	51	9	4.8	17	52	8	3.4	19	42	8	4.0
Diarrhea	86	73	63	2.0	96	89	86	1.6	97	85	82	1.8	89	70	62	2.1	58	63	38	2.8	50	57	28	3.3
Dysentery	48	42	20	3.5	64	64	42	3.4	69	59	40	3.0	45	57	26	3.3	23	45	11	4.2	21	41	9	4.8
Erysipelas	35	37	13	3.6	32	44	14	5.0	34	38	13	3.8	28	46	13	3.5	38	49	19	3.6	43	46	20	4.4
Fever, Intermittent	70	62	44	2.8	59	77	45	2.8	59	70	42	2.8	56	69	38	2.8	50	68	34	2.8	41	64	25	3.6
Fever, Remittent	53	52	28	2.7	51	65	34	3.1	51	64	38	2.7	58	67	37	2.6	43	69	30	2.7	36	63	23	3.4
Fever, Typhoid (Enteric)	13	47	6	3.5	21	59	12	4.0	32	66	21	3.4	35	76	27	2.8	31	69	21	2.9	20	76	15	3.8
Fever, Typho-malarial	9	31	3	3.3	14	37	6	2.7	16	54	9	3.3	32	53	17	2.9	14	50	7	3.4	6	38	2	4.8
Influenza	51	59	30	3.0	29	60	19	3.3	44	54	24	3.2	42	69	29	2.9	57	69	41	2.2	96	75	72	1.6
Kidney, Inflammation of	40	49	20	3.3	33	55	19	3.9	38	46	17	3.7	36	54	19	3.6	37	60	23	3.5	40	57	23	4.0
Measles	20	44	9	3.3	10	47	5	3.4	4	28	1	3.3	2	29	1	1.0	4	25	1	2.5	3	29	1	2.7
Neuralgia	86	70	61	2.5	73	73	55	2.9	79	74	58	2.8	78	76	60	2.5	83	79	66	2.3	83	79	66	2.7
Pleuritis	24	48	10	3.8	14	40	6	4.7	27	48	12	4.0	31	61	19	3.7	39	55	22	3.5	40	54	21	4.1
Pneumonia	19	41	7	3.7	17	47	8	5.1	18	37	7	4.0	30	52	16	4.3	37	56	21	3.6	67	56	38	3.9
Puerperal Fever	5	37	2	3.3	2	25	1	5.0	9	27	3	4.9	6	46	3	5.2	6	27	2	4.3	9	33	3	4.3
Rheumatism	88	72	64	2.8	77	76	60	3.2	88	69	60	3.0	88	76	67	2.7	81	80	65	2.5	90	75	67	3.0
Scarlatina	13	57	7	4.3	14	59	8	4.3	21	42	9	3.8	17	61	10	3.7	11	66	7	4.1	19	34	7	3.8
Small-pox	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tonsillitis	69	57	38	2.9	58	55	30	3.5	62	58	36	3.2	70	66	46	3.1	72	67	49	2.8	83	69	59	3.2
Whooping-cough	21	51	11	2.3	24	58	14	2.8	24	51	12	2.7	16	73	11	1.9	22	57	12	2.6	16	58	9	3.4

TABLE 2.—CONTINUED.—*Diseases in the State, 1891.* (*For foot-notes and full tabular heads, see pages 98–99.*)

Diseases.	January.† Per ct. of Observers Reporting Pres. of. b	January.† Av. Per ct. of Weeks Reported Present, where present. a, c	January.† Per cent of Reports stating Pres. of. d	January.† Av. Order of Prevalence where Pres. e	February.† Per ct. of Observers Reporting Pres. of. b	February.† Av. Per ct. of Weeks Reported Present where Present. a, c	February.† Per cent of Reports stating Pres. of. d	February.† Av. Order of Prevalence where Pres. e	March.† Per ct. of Observers Reporting Pres. of. b	March.† Av. per ct. of Weeks Reported Present where Present. a, c	March.† Per cent of Reports stating Pres. of. d	March.† Av. Order of Prevalence where Pres. e	April.† Per ct. of Observers Reporting Pres. of. b	April.† Av. per ct. of Weeks Reported Present where Present. a, c	April.† Per cent of Reports stating Pres. of. d	April.† Av. Order of Prevalence where Pres. e	May.† Per ct. of Observers Reporting Pres. of. b	May.† Av. per ct. of Weeks Reported Present where Present. a, c	May.† Per cent of Reports stating Pres. of. d	May.† Av. Order of Prevalence where Pres. e	June.† Per ct. of Observers Reporting Pres. of. b	June.† Av. per ct. of Weeks Reported Present where Present. a, c	June.† Per cent of Reports stating Pres. of. d	June.† Av. Order of Prevalence where Pres. e
Av. for Tab. Dis. Rep. Pres.	38	71	27	3.6	37	71	27	3.6	38	71	27	3.6	40	68	27	3.7	37	68	25	3.8	33	65	22	2.9
Brain, Inflammation of	9	37	3	7.0	17	43	7	5.6	22	39	8	5.4	10	36	4	5.0	11	46	5	5.3	5	41	2	3.4
Bowels, Inflammation of	23	46	10	4.2	25	51	13	5.2	19	46	9	4.8	22	51	12	5.2	27	52	14	4.8	31	48	15	3.7
Bronchitis	88	91	81	2.4	91	87	79	2.5	90	90	81	2.6	90	85	76	2.6	80	79	64	2.7	65	73	48	2.6
Cerebro-spinal Meningitis	6	33	2	4.2	9	48	4	6.3	6	58	3	6.0	8	33	2	7.2	4	69	3	5.8	5	47	3	4.0
Cholera Infantum	6	33	2	6.2	5	36	2	4.3	1	25	0.3	9.0	1	20	0.3	9.0	5	42	2	5.8	16	45	7	3.6
Cholera Morbus	10	41	4	4.3	10	33	4	4.4	11	45	5	8.8	12	40	5	4.6	16	34	6	4.2	34	43	15	3.6
Consumption, Pulmonary	68	84	58	3.9	62	81	51	3.7	66	81	54	4.0	73	81	59	4.1	62	90	55	3.7	57	80	46	3.4
Croup, Membranous	17	54	9	4.8	15	51	8	4.7	20	45	10	4.9	12	40	4	4.7	5	37	2	5.6	3	25	1	4.3
Diphtheria	18	41	8	4.5	13	33	4	5.1	8	38	3	4.3	10	33	4	5.1	8	36	3	4.1	11	41	5	3.3
Diarrhea	52	60	31	3.9	45	59	27	4.1	55	56	31	3.7	53	56	30	4.0	58	61	37	3.2	58	64	38	2.6
Dysentery	18	41	5	5.2	13	53	6	4.8	8	56	5	6.9	17	38	6	5.0	19	46	9	4.5	21	46	10	3.5
Erysipelas	41	60	25	4.5	47	61	29	4.6	48	51	25	4.7	38	53	20	4.9	46	47	21	4.2	37	50	19	3.4
Fever, Intermittent	51	68	36	3.7	46	69	33	3.7	48	66	33	4.0	52	64	33	3.9	45	75	34	3.5	48	71	36	2.6
Fever, Remittent	44	67	31	3.7	40	67	28	4.1	38	69	26	4.5	43	60	25	4.5	33	69	23	3.5	38	62	21	2.8
Fever, Typhoid (enteric)	8	71	5	4.6	7	75	5	4.2	3	78	2	8.3	6	35	2	5.8	4	60	3	4.8	9	89	3	3.4
Fever, Typho-malarial	10	60	7	5.3	9	52	5	5.4	9	55	5	4.0	6	48	2	7.0	4	47	2	2.5	4	62	2	2.8
Influenza	86	90	80	1.7	87	91	81	1.5	98	88	87	1.4	100	95	95	1.3	90	83	75	1.8	59	72	44	2.2
Kidney, Inflammation of	30	64	19	4.6	37	58	20	4.8	30	63	19	4.6	36	58	21	4.1	42	60	25	4.1	34	58	21	3.4
Measles	18	43	8	3.2	20	60	12	3.6	33	72	24	3.1	44	61	28	3.2	31	74	23	2.3	27	64	18	2.4
Neuralgia	89	81	73	3.0	86	86	75	3.0	89	82	78	3.1	87	82	72	3.3	87	76	67	2.8	80	82	67	2.4
Pleuritis	45	66	31	4.2	45	61	28	4.3	42	66	28	4.6	58	54	31	4.4	43	54	24	3.8	32	55	18	3.7
Pneumonia	68	67	48	4.1	71	69	49	4.0	65	68	45	4.2	77	60	46	4.2	58	53	32	3.9	25	51	13	4.2
Puerperal Fever	11	37	4	5.0	8	42	4	5.0	7	35	2	4.5	8	28	2	5.3	10	33	3	4.2	10	46	5	2.9
Rheumatism	90	84	77	3.0	91	81	75	3.1	85	87	76	3.2	92	86	80	3.3	87	86	76	2.8	81	84	69	2.4
Scarlatina	24	45	11	4.5	17	62	11	4.3	19	55	11	5.4	23	48	11	5.2	18	65	12	3.8	13	55	7	2.8
Small-pox	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tonsillitis	80	76	61	3.5	83	76	63	3.4	88	73	61	3.7	88	69	61	3.7	84	60	51	3.3	64	62	41	3.0
Whooping-cough	9	45	4	4.5	8	50	4	3.1	13	40	5	3.2	18	47	6	4.2	9	74	7	3.6	12	59	7	2.2

	July. †				August. †				September. †				October. †				November. †				December. †			
Av. for Tab. Dis. Rep. Pres.	40	58	23	3.1	38	66	26	3.3	41	61	25	3.1	37	65	24	3.1	35	65	23	3.0	37	63	24	3.4
Brain, Inflammation of	16	32	5	3.5	8	38	8	5.3	10	25	2	4.1	7	36	3	4.7	9	38	8	3.8	9	33	3	4.6
Bowels, Inflammation of	34	44	15	4.1	39	49	19	4.4	42	47	20	4.0	35	44	15	3.6	35	49	18	3.9	34	39	13	4.6
Bronchitis	65	67	43	3.1	50	70	36	3.6	70	64	44	3.1	66	73	48	2.8	72	78	57	2.5	81	88	68	2.5
Cerebro-spinal Meningitis	9	30	3	4.1	3	60	2	4.7	10	28	3	4.8	4	31	1	5.8	4	33	1	3.8	7	33	2	6.5
Cholera Infantum	54	50	27	3.9	63	68	43	3.2	66	62	41	3.2	31	45	14	3.8	9	31	3	4.3	9	28	3	3.4
Cholera Morbus	63	54	34	3.0	76	66	52	2.8	65	58	37	3.1	38	47	18	3.6	16	47	7	3.4	12	38	5	4.1
Consumption, Pulmonary	61	75	45	3.5	55	77	43	3.7	54	80	43	3.7	50	86	44	4.0	55	82	46	3.8	56	80	45	4.3
Croup, Membranous	4	21	1	2.7	0	0	0	0	3	23	1	3.0	8	33	1	6.3	11	46	5	4.5	19	33	6	5.3
Diphtheria	15	47	7	4.7	9	50	4	5.8	13	37	5	4.5	17	51	9	4.8	17	52	8	3.4	19	42	8	4.0
Diarrhea	86	73	63	2.0	96	89	86	1.6	97	85	82	1.8	89	70	62	2.1	58	63	38	2.8	50	57	28	3.3
Dysentery	48	42	20	3.5	64	64	42	3.4	69	59	40	3.0	45	57	26	3.3	23	45	11	4.2	21	41	9	4.8
Erysipelas	35	37	13	3.6	32	44	14	5.0	34	38	13	3.8	28	46	13	3.5	38	49	19	3.6	43	46	20	4.4
Fever, Intermittent	70	62	44	2.8	59	77	45	2.8	59	70	42	2.8	56	69	38	2.8	50	68	34	2.8	41	64	25	3.6
Fever, Remittent	53	52	28	2.7	51	65	34	3.1	51	64	33	2.7	58	67	37	2.6	43	69	30	2.7	36	63	23	3.4
Fever, Typhoid (Enteric)	18	47	6	3.5	21	59	12	4.0	32	66	21	3.4	35	76	27	2.8	31	69	21	2.9	20	76	15	3.8
Fever, Typho-malarial	9	31	3	3.3	14	37	6	2.7	16	54	9	3.3	32	53	17	2.9	14	50	7	3.4	6	38	2	4.8
Influenza	51	59	30	3.0	29	60	19	3.3	44	54	24	3.2	42	69	29	2.9	57	69	41	2.2	96	75	72	1.6
Kidney, Inflammation of	40	49	20	3.3	33	55	19	3.9	38	46	17	3.7	36	54	19	3.6	37	60	23	3.5	40	57	23	4.0
Measles	20	44	9	3.3	10	47	5	3.4	4	28	1	3.3	2	29	1	1.0	4	25	1	2.5	3	29	1	2.7
Neuralgia	86	70	61	2.5	78	73	55	2.9	79	74	58	2.8	78	76	60	2.5	83	79	66	2.3	83	79	66	2.7
Pleuritis	24	48	10	3.8	14	40	6	4.7	27	48	12	4.0	31	61	19	3.7	39	55	22	3.5	40	54	21	4.1
Pneumonia	19	41	7	3.7	17	47	8	5.1	18	37	7	4.0	30	52	16	4.3	37	56	21	3.6	67	56	38	3.9
Puerperal Fever	5	37	2	3.3	2	25	1	5.0	9	27	8	4.9	6	46	8	5.2	6	27	2	4.3	9	33	3	4.3
Rheumatism	88	72	64	2.8	77	76	60	3.2	88	69	60	3.0	88	76	67	2.7	81	80	65	2.5	90	75	67	3.0
Scarlatina	13	57	7	4.3	14	59	8	4.3	21	42	9	3.8	17	61	10	3.7	11	66	7	4.1	19	34	7	3.8
Small-pox	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tonsillitis	69	57	38	2.9	58	55	30	3.5	62	58	36	3.2	70	66	46	3.1	72	67	49	2.8	83	69	59	3.2
Whooping-cough	21	51	11	2.3	24	58	14	2.8	24	51	12	2.7	16	73	11	1.9	22	57	12	2.6	16	58	9	3.4

TABLE 2.—CONTINUED.—*Diseases in the State, 1891.* (*For foot-notes and full tabular heads, see pages 98-99.*)

Months. † Diseases.	January. † Per ct. of Observers Reporting Pres., of. b	Av. Per ct. of Weeks Reported Present, where present, a, c	Per cent of Reports stating Pres., of. d	Av. Order of Prevalence where Pres. e	February. † Per ct. of Observers Reporting Pres., of. b	Av. Per ct. of Weeks Reported Present where Present, a, c	Per cent of Reports stating Pres., of. d	Av. Order of Prevalence where Pres. e	March. † Per ct. of Observers Reporting Pres., of. b	Av. per ct. of Weeks Reported Present where Present, a, c	Per cent of Reports stating Pres., of. d	Av. Order of Prevalence where Pres. e	April. † Per ct. of Observers Reporting Pres., of. b	Av. per ct. of Weeks Reported Present where Present, a, c	Per cent of Reports stating Pres., of. d	Av. Order of Prevalence where Pres. e	May. † Per ct. of Observers Reporting Pres., of. b	Av. per ct. of Weeks Reported Present where Present, a, c	Per cent of Reports stating Pres., of. d	Av. Order of Prevalence where Pres. e	June. † Per ct. of Observers Reporting Pres., of. b	Av. per ct. of Weeks Reported Present where Present, a, c	Per cent of Reports stating Pres., of. d	Av. Order of Prevalence where Pres. e
Av. for Tab. Dis. Rep. Pres.	38	71	27	3.6	37	71	27	3.6	38	71	27	3.6	40	68	27	3.7	37	68	25	3.3	33	65	22	2.9
Brain, Inflammation of	9	37	3	7.0	17	43	7	5.6	22	39	8	5.4	10	36	4	5.0	11	46	5	5.8	5	41	2	3.4
Bowels, Inflammation of	23	46	10	4.2	25	51	13	5.2	19	46	9	4.8	22	51	12	5.2	27	52	14	4.8	31	48	15	3.7
Bronchitis	88	91	81	2.4	91	87	79	2.5	90	90	81	2.6	90	85	76	2.6	80	79	64	2.7	65	73	48	2.6
Cerebro-spinal Meningitis	6	33	2	4.2	9	48	4	6.3	6	58	8	6.0	8	33	2	7.2	4	69	3	5.8	5	47	3	4.0
Cholera Infantum	6	33	2	6.2	5	36	2	4.3	1	25	0.8	9.0	1	20	0.8	9.0	5	42	2	5.8	16	45	7	3.6
Cholera Morbus	10	41	4	4.3	10	33	4	4.4	11	45	5	8.8	12	40	5	4.6	16	34	6	4.2	34	43	15	3.6
Consumption, Pulmonary	68	84	58	3.9	62	81	51	3.7	66	81	54	4.0	73	81	59	4.1	62	90	55	3.7	57	80	46	3.4
Croup, Membranous	17	54	9	4.8	15	51	8	4.7	20	45	10	4.9	12	40	4	4.7	5	37	2	5.6	3	25	1	4.3
Diphtheria	18	41	8	4.5	13	33	4	5.1	8	38	3	4.3	10	33	4	5.1	8	36	3	4.1	11	41	5	3.3
Diarrhea	52	60	31	3.9	45	59	27	4.1	55	56	31	3.7	53	56	30	4.0	58	61	37	3.2	58	64	38	2.6
Dysentery	13	41	5	5.2	13	53	6	4.8	8	56	5	6.9	17	38	6	5.0	19	46	9	4.5	21	46	10	3.5
Erysipelas	41	60	25	4.5	47	61	29	4.6	48	51	25	4.7	38	53	20	4.9	46	47	21	4.2	37	50	19	3.4
Fever, Intermittent	51	68	36	3.7	46	69	33	3.7	48	66	33	4.0	52	64	33	3.9	45	75	34	3.5	48	71	36	2.6
Fever, Remittent	44	67	31	3.7	40	67	28	4.1	36	69	26	4.5	43	60	25	4.5	33	69	23	3.5	33	62	21	2.8
Fever, Typhoid (enteric)	8	71	5	4.6	7	75	5	4.2	3	73	2	3.3	6	35	2	5.8	4	60	3	4.8	9	89	3	3.4
Fever, Typho-malarial	10	60	7	5.3	9	52	5	5.4	9	55	5	4.0	6	43	2	7.0	4	47	2	2.5	4	62	2	2.8
Influenza	86	90	80	1.7	87	91	81	1.5	98	88	87	1.4	100	95	95	1.3	90	53	75	1.8	59	72	44	2.2
Kidney, Inflammation of	30	61	19	4.6	37	53	20	4.8	30	63	19	4.6	36	58	21	4.1	42	60	25	4.1	34	58	21	3.4
Measles	18	43	8	3.2	20	60	12	3.6	33	72	24	3.1	44	61	28	3.2	31	74	28	2.3	27	64	18	2.4
Neuralgia	89	81	73	3.0	86	86	75	3.0	89	82	73	3.1	87	82	72	3.3	87	76	67	2.8	80	82	67	2.4
Pleuritis	45	66	31	4.2	45	61	28	4.3	42	66	28	4.6	58	54	31	4.4	43	54	24	3.8	32	55	18	3.7
Pneumonia	68	67	48	4.1	71	69	49	4.0	65	68	45	4.2	77	60	46	4.2	58	53	32	3.9	25	51	13	4.2
Puerperal Fever	11	37	4	5.0	8	42	4	5.0	7	35	2	4.5	8	28	2	5.3	10	33	3	4.2	10	46	5	2.9
Rheumatism	90	84	77	3.0	91	81	75	3.1	85	87	76	3.2	92	86	80	3.3	87	86	76	2.8	81	84	69	2.4
Scarlatina	24	45	11	4.5	17	62	11	4.3	19	55	11	5.4	28	48	11	5.2	18	65	12	3.8	13	55	7	2.8
Small-pox	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tonsillitis	80	76	61	3.5	83	76	63	3.4	83	73	61	3.7	88	69	61	3.7	84	60	51	3.3	64	62	41	3.0
Whooping-cough	9	45	4	4.5	8	50	4	3.1	13	40	5	3.2	13	47	6	4.2	9	74	7	3.6	12	59	7	2.2

Av. for Tab. Dis. Rep. Pres.	40	July. †			August. †			September. †			October. †			November. †			December. †		
		58	23	3.1	38	66	26	3.3	41	61	25	3.1	37	65	24	3.1	35	65	23	3.0	37	63	24	3.4
Brain, Inflammation of	16	32	5	3.5	8	38	8	5.3	10	25	2	4.1	7	36	3	4.7	9	38	8	3.8	9	33	3	4.6
Bowels, Inflammation of	34	44	15	4.1	39	49	19	4.4	42	47	20	4.0	35	44	15	3.6	35	49	18	3.9	34	39	13	4.6
Bronchitis	65	67	43	3.1	50	70	36	3.6	70	64	44	3.1	66	73	48	2.8	72	78	57	2.5	81	88	68	2.5
Cerebro-spinal Meningitis	9	30	3	4.1	3	60	2	4.7	10	26	3	4.8	4	31	1	5.8	4	33	1	3.8	7	33	2	6.5
Cholera Infantum	54	50	27	3.9	63	68	48	3.2	66	62	41	3.2	31	45	14	3.8	9	31	3	4.3	9	28	3	3.4
Cholera Morbus	63	54	34	3.0	76	66	52	2.8	65	58	38	3.1	38	47	18	3.6	16	47	7	3.4	12	38	5	4.1
Consumption, Pulmonary	61	75	45	3.5	55	77	43	3.7	54	60	43	3.7	50	86	44	4.0	55	82	46	3.8	56	80	45	4.3
Croup, Membranous	4	21	1	2.7	0	0	0	0	3	23	1	3.0	3	33	1	6.3	11	46	5	4.5	19	33	6	5.3
Diphtheria	15	47	7	4.7	9	50	4	5.8	13	37	5	4.5	17	51	9	4.8	17	52	8	3.4	19	42	8	4.0
Diarrhœa	86	73	65	2.0	96	89	86	1.6	97	85	82	1.8	89	70	62	2.1	58	63	38	2.8	50	57	28	3.8
Dysentery	43	42	20	3.5	64	64	42	3.4	69	59	40	3.0	45	57	26	3.3	23	45	11	4.2	21	41	9	4.8
Erysipelas	35	37	13	3.6	32	44	14	5.0	34	38	13	3.8	23	46	13	3.5	38	49	19	3.6	43	46	20	4.4
Fever, Intermittent	70	62	44	2.8	59	77	45	2.8	59	70	42	2.8	56	69	38	2.8	50	68	34	2.8	41	64	25	3.6
Fever, Remittent	53	52	26	2.7	51	65	34	3.1	51	64	33	2.7	53	67	27	2.6	43	69	30	2.7	36	63	23	3.4
Fever, Typhoid (Enteric)	18	47	6	3.5	21	59	12	4.0	32	66	21	3.4	35	76	27	2.8	31	69	21	2.9	20	76	15	3.8
Fever, Typho-malarial	9	31	3	3.8	14	37	6	2.7	16	54	9	3.3	82	53	17	2.9	14	50	7	3.4	6	38	2	4.3
Influenza	51	59	30	3.0	29	60	19	3.3	44	54	24	3.2	42	69	29	2.9	57	69	41	2.2	96	75	72	1.6
Kidney, Inflammation of	40	49	20	3.3	33	55	19	3.9	38	46	17	3.7	36	54	19	3.6	37	60	23	3.5	40	57	23	4.0
Measles	20	44	9	3.3	10	47	5	3.4	4	28	1	3.3	2	29	1	1.0	4	25	1	2.5	3	29	1	2.7
Neuralgia	86	70	61	2.5	73	73	55	2.9	79	74	58	2.8	78	76	60	2.5	88	79	66	2.3	83	79	66	2.7
Pleuritis	24	48	10	3.8	14	40	6	4.7	27	48	12	4.0	31	61	19	3.7	39	55	22	3.5	40	54	21	4.1
Pneumonia	19	41	7	3.7	17	47	8	5.1	18	57	7	4.0	30	52	16	4.3	37	56	21	3.6	67	56	38	3.9
Puerperal Fever	5	37	2	3.3	2	25	1	5.0	9	27	3	4.9	6	46	8	5.2	6	27	2	4.3	9	33	3	4.3
Rheumatism	88	72	64	2.8	77	76	60	3.2	88	69	60	3.0	88	76	67	2.7	81	80	65	2.5	90	75	67	3.0
Scarlatina	13	57	7	4.3	14	59	8	4.8	21	42	9	3.8	17	61	10	3.7	11	66	7	4.1	19	34	7	3.8
Small-pox	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tonsilitis	69	57	38	2.9	53	55	30	3.5	62	58	36	3.2	70	66	46	3.1	72	67	49	2.8	83	69	59	3.2
Whooping-cough	21	51	11	2.3	24	58	14	2.8	24	51	12	2.7	16	73	11	1.9	22	57	12	2.6	16	58	9	3.4

TABLE 2.—CONTINUED.—*Diseases in the Upper Peninsular, the Northwestern, the Northern, and the Northeastern Divisions of the State for the years 1877–1890, also for the years 1886–1890, for the year and by months in 1891.—Indicating what Per Cent of the Weekly Reports Received stated the Presence of the Diseases Named.*[d]

Division.*	Diseases.	1877-90.‡	1886-90.	1891.†	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Upper Peninsular Division.*	Av. for Tab. Dis. Rep. Pr..	29	26	24	36	30	34	36	29	33	34	33	25	26	22	28
	Brain, Inflam. of	7	10	3	0	0	6	5	4	0	0	4	2	0	5	6
	Bowels, Inflam. of	18	15	10	0	6	6	0	7	22	13	21	13	5	11	10
	Bronchitis	74	76	58	71	72	69	68	67	65	48	50	36	50	58	71
	Cerebro-spi. Meningitis	3	4	1	0	0	0	0	0	0	0	0	4	3	0	4
	Cholera Infantum	13	12	22	0	0	0	0	4	9	74	79	49	11	5	10
	Cholera Morbus	20	25	20	0	6	0	5	11	22	52	58	34	18	11	12
	Consumption, Pul.	66	48	35	18	28	0	11	33	35	43	46	34	39	32	53
	Croup, Membranous	6	7	2	0	6	6	5	0	0	0	0	0	0	5	6
	Diphtheria	10	13	6	6	0	0	5	4	9	9	17	6	3	3	8
	Diarrhea	63	66	63	41	38	38	63	63	61	91	96	79	63	50	59
	Dysentery	24	20	19	6	0	0	11	15	17	30	50	32	21	11	14
	Erysipelas	23	20	12	18	11	6	0	15	9	4	13	17	11	13	18
	Fever, Intermittent	8	8	3	0	0	0	0	7	0	4	17	9	0	0	0
	Fever, Remittent	12	5	5	0	0	0	0	0	0	0	0	13	11	8	8
	Fever, Typhoid (enteric)	29	26	42	24	11	0	0	15	9	4	46	72	82	76	51
	Fever, Typho-mal.	4	4	3	0	0	0	0	0	0	0	0	11	11	3	2
	Influenza	41	25	43	82	88	88	95	70	61	26	8	15	8	18	57
	Kidney, Inflam. of	37	29	14	24	6	0	0	26	22	13	13	11	5	18	22
	Measles	17	15	8	18	22	19	32	19	4	0	8	6	0	3	0
	Neuralgia	57	60	57	65	67	56	58	59	74	48	50	40	58	58	63
	Pleuritis	20	20	23	65	28	19	53	19	30	17	13	13	11	26	20
	Pneumonia	37	30	22	47	33	25	32	22	17	4	8	11	26	16	38
	Puerperal Fever	6	7	4	0	0	0	0	4	4	17	4	2	5	3	6
	Rheumatism	63	59	55	35	56	56	74	67	78	65	50	43	37	47	63
	Scarlatina	23	11	14	18	6	0	16	26	30	22	17	11	13	3	12
	Small-pox	0.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tonsillitis	50	56	61	65	67	69	68	67	65	61	46	53	58	55	67
	Whooping-cough	21	15	31	6	6	19	16	44	43	61	46	40	39	18	14

Division.*	Diseases.	1877-90.‡	1886-90.	1891.†	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Northwestern Division.*	Av. for Tab. Dis. Rep. Pr..	31	27	25	50	41	53	43	48	35	29	32	26	40	38	30
	Brain, Inflam. of	5	7	11	0	20	43	8	0	0	8	0	15	18	20	7
	Bowels, Inflam. of	10	11	30	0	40	14	38	63	23	31	14	8	45	50	36
	Bronchitis	61	61	61	100	100	100	92	75	69	54	43	31	27	20	43
	Cerebro-spi. Meningitis	2	0.6	2	0	0	0	0	0	0	0	0	23	0	0	0
	Cholera Infantum	21	18	19	0	10	0	0	0	46	31	71	23	27	0	14
	Cholera Morbus	20	16	9	0	10	0	0	13	23	15	29	8	18	0	0
	Consumption, Pul.	46	59	52	89	70	57	85	75	46	54	43	31	36	30	29
	Croup, Membranous	6	4	2	11	10	0	0	0	0	0	0	0	0	0	0
	Diphtheria	14	7	2	0	0	0	0	0	0	0	0	0	0	0	14
	Diarrhea	54	46	28	0	0	14	23	63	46	23	14	54	45	20	21
	Dysentery	28	25	31	11	20	0	31	50	54	46	43	23	55	30	7
	Erysipelas	30	20	20	22	30	43	15	25	23	15	0	15	0	10	43
	Fever, Intermittent	65	43	18	23	10	0	0	0	8	23	29	23	36	30	29
	Fever, Remittent	38	39	16	11	10	0	0	0	8	8	0	38	36	30	29
	Fever, Typhoid (enteric)	12	16	3	0	0	0	0	0	0	15	14	8	0	0	0
	Fever, Typho-mal.	24	14	0	0	0	0	0	0	0	0	0	0	0	0	0
	Influenza	43	37	39	67	60	86	85	63	23	8	14	8	0	30	50
	Kidney, Inflam. of	28	13	45	44	30	29	46	38	23	46	57	38	82	50	50
	Measles	14	11	2	0	0	0	0	0	0	8	14	0	0	0	0
	Neuralgia	68	61	40	78	60	57	31	25	23	8	14	31	45	80	43
	Pleuritis	24	24	34	33	30	71	62	38	46	23	14	8	36	20	29
	Pneumonia	41	46	51	67	70	71	54	50	31	69	29	23	36	70	50
	Puerperal Fever	5	4	6	0	0	0	8	25	31	0	0	0	0	0	7
	Rheumatism	68	61	67	89	70	57	69	38	54	54	86	85	64	90	50
	Scarlatina	18	10	9	22	0	14	8	0	0	0	0	15	27	0	21
	Small-pox	0.8	0	0	0	0	0	0	0	0	0	9	0	0	0	0
	Tonsillitis	57	54	60	89	90	86	77	75	54	62	14	38	36	60	50
	Whooping-cough	16	8	5	0	0	0	8	0	0	8	29	0	0	10	7

Northern Division.*	Av. for Tab. Dis. Rep. Pr..	18	16	31	64	64	79	62	57	47	32	36	34	37	70	70	Northeastern Division.*	27	24	29	44	43	41	39	40	41	76	36	89	43	41	61
	Brain, Inflam. of	9	15	25	0	33	75	20	43	13	22	38	11	17	50	0		3	3	9	0	0	0	0	20	30	0	22	20	0	0	0
	Bowels, Inflam. of	6	8	17	25	33	25	0	0	38	22	13	22	17	0	0		19	16	24	11	33	13	0	40	60	40	22	80	0	0	0
	Bronchitis	43	35	72	100	100	75	100	71	63	22	75	67	67	100	100		75	70	65	78	78	50	50	73	60	100	44	100	57	50	63
	Cerebro-spi. Meningitis	4	6	8	0	0	0	0	0	0	22	13	22	0	0	20		2	1.1	4	0	0	0	0	0	30	0	11	0	0	0	0
	Cholera Infantum	6	7	10	0	0	0	0	0	0	11	38	22	17	0	0		10	9	6	22	11	0	0	0	10	0	22	0	0	0	0
	Cholera Morbus	6	7	3	0	0	0	0	0	0	0	13	0	0	25	0		11	9	5	0	0	0	0	7	10	0	22	0	14	0	0
	Consumption, Pul	31	43	71	100	100	100	100	100	63	11	63	44	67	100	100		52	40	37	67	78	50	50	73	40	0	0	0	0	13	0
	Croup, Membranous	2	3	1	0	0	0	0	0	0	11	0	0	0	0	0		6	3	0	0	0	0	0	0	0	0	0	0	0	0	0
	Diphtheria	6	3	0	0	0	0	0	0	0	0	0	0	0	0	0		7	6	0	0	0	0	0	0	0	0	0	0	0	0	0
	Diarrhea	26	13	14	0	0	0	0	14	13	11	38	33	17	0	0		58	51	33	11	11	25	10	33	20	40	89	100	57	38	0
	Dysentery	17	11	15	0	0	0	0	0	0	11	63	33	33	0	0		21	18	6	0	0	0	0	7	10	0	33	0	14	0	0
	Erysipelas	19	27	71	75	67	100	60	57	100	78	63	56	67	50	80		24	23	32	33	44	18	20	33	40	40	11	100	29	0	50
	Fever, Intermittent	25	24	44	50	67	75	60	57	38	33	13	11	33	75	100		33	43	62	67	44	63	50	40	70	80	75	100	86	50	63
	Fever, Remittent	6	8	32	50	33	0	0	0	50	67	50	44	33	0	0		14	5	4	0	0	0	0	7	0	0	22	0	0	13	0
	Fever, Typhoid (enteric)	8	7	0	0	0	0	0	0	0	0	0	0	0	0	0		3	2.1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Fever, Typho-mal.	8	6	0	0	0	0	0	0	0	0	0	0	0	0	0		8	5	3	0	0	0	0	0	10	0	0	0	29	0	0
	Influenza	25	17	75	100	67	100	100	100	100	67	38	56	33	100	80		43	52	71	67	56	63	100	87	70	100	44	100	57	50	63
	Kidney, Inflam. of	12	12	32	25	33	75	20	57	38	22	13	11	17	75	40		30	22	48	44	33	50	10	27	60	80	67	100	57	38	63
	Measles	8	4	3	0	0	0	0	0	13	11	0	0	0	0	0		9	8	14	11	11	50	40	13	0	0	11	0	14	0	0
	Neuralgia	47	34	64	50	100	100	100	43	38	33	38	44	50	100	100		75	67	68	100	100	63	50	60	60	100	44	100	57	50	63
	Pleuritis	19	19	26	0	0	75	40	0	25	11	0	33	33	75	40		11	11	19	22	33	0	20	47	50	0	11	0	0	0	0
	Pneumonia	18	14	21	0	67	75	40	43	38	0	0	0	17	25	0		31	26	28	44	33	0	10	40	30	0	22	0	14	50	63
	Puerperal Fever	6	4	3	0	0	0	0	0	0	0	0	0	0	25	20		3	2	1	11	0	0	0	0	0	0	0	0	0	0	0
	Rheumatism	55	47	69	75	67	75	40	86	63	89	38	56	83	100	80		71	68	65	67	67	50	50	67	70	100	67	100	57	50	63
	Scarlatina	3	2	8	0	0	0	0	0	25	33	0	0	17	0	0		5	2	0	0	0	0	0	0	0	0	0	0	0	0	0
	Small-pox	0.1	.02	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tonsillitis	29	31	36	50	67	75	0	14	25	44	13	11	50	75	80		60	50	50	67	44	38	50	47	70	0	33	80	57	50	63
	Whooping-cough	9	8	0	0	0	0	0	0	0	0	0	0	0	0	0		8	9	5	22	11	13	0	0	10	0	0	0	0	0	0

*, †, d. See page 99. ‡ Inflammation of kidney was not compiled until 1884. For inflammation of brain and inflammation of bowels, an average for the 11 years, 1880-90; for neuralgia and tonsillitis, an average for the 12 years, 1879-90; pleuritis was not compiled until 1888; for other diseases and for the average line, an average for the 14 years, 1877-90. For the Northern Division, 1882-90. For the Northeastern Division, 1883-90.

TABLE 2.—CONTINUED.—*Diseases in the Western, Northern Central, Bay and Eastern, and the Central Divisions of the State, for the Years 1877-1890, also for the years 1886-1890, for the Year and by Months in 1891, indicating what Per Cent of the Weekly Reports Received Stated the Presence of the Diseases Named.*[a]

Division.*	Diseases.	1877-90.‡	1886-90.	1891.†	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
	Av. for Tab. Dis, Rep. Pr.	30	26	29	33	38	39	39	40	31	35	32	34	34	33	35
Western Division.*	Brain, Inflammation of	4	4	4	4	7	4	14	5	0	0	5	3	7	7	0
	Bowels, Inflammation of	16	15	19	22	37	11	14	10	9	23	23	29	19	11	14
	Bronchitis	55	54	56	67	78	78	55	45	55	53	18	40	56	57	64
	Cerebro-spi. Meningitis	4	3.3	5	7	4	7	14	15	9	0	0	0	0	4	7
	Cholera Infantum	14	10	19	0	0	0	0	0	9	50	68	63	28	4	0
	Cholera Morbus	19	14	24	4	7	11	14	0	36	47	73	54	15	14	4
	Consumption, Pul.	48	44	49	52	52	63	59	60	45	36	27	40	52	68	43
	Croup, Membranous	6	6	9	26	26	19	14	10	5	0	0	3	0	0	4
	Diphtheria	22	9	9	7	7	0	0	5	5	27	14	0	7	14	18
	Diarrhea	46	45	55	44	41	41	27	50	55	80	86	94	70	50	11
	Dysentery	23	16	21	4	0	0	0	0	32	33	59	69	26	11	7
	Erysipelas	28	24	17	19	37	22	14	20	18	20	9	6	4	21	14
	Fever, Intermittent	70	58	52	48	56	52	28	50	59	70	68	57	44	50	46
	Fever, Remittent	56	37	57	67	48	44	32	55	77	60	78	57	63	64	50
	Fever, Typhoid (enteric)	10	8	7	4	0	0	0	0	5	3	5	23	26	11	0
	Fever, Typo-malarial	23	16	10	7	19	22	28	0	0	7	0	6	26	7	0
	Influenza	46	44	56	59	63	78	100	95	50	40	14	23	30	64	75
	Kidney, Inflammation of	15	14	24	22	30	33	27	15	18	20	9	17	22	32	36
	Measles	6	13	3	0	7	22	0	0	0	3	0	0	0	0	0
	Neuralgia	72	74	78	89	93	74	82	90	82	73	50	66	81	82	75
	Pleuritis	18	18	28	41	37	41	41	45	18	13	5	14	33	32	21
	Pneumonia	36	28	39	74	74	63	68	40	27	10	0	6	22	29	61
	Puerperal Fever	7	6	3	4	4	0	0	10	18	0	0	0	0	0	0
	Rheumatism	63	68	60	67	67	67	64	75	50	53	32	60	67	68	54
	Scarlatina	20	9	14	11	7	26	14	25	9	17	14	9	26	11	0
	Small-pox	0.7	.2	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tonsillitis	53	52	57	70	74	81	86	70	45	40	14	29	52	57	71
	Whooping-cough	14	12	11	4	0	4	0	0	5	30	5	23	11	18	21

Division.*	Diseases.	1877-90.‡	1886-90.	1891.†	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
	Av. for Tab. Dis, Rep. Pr.	26	21	22	35	54	57	73	34	38	42	38	78	86	40	19
Northern Central Division.*	Brain, Inflammation of	3	3	0	0	0	0	0	0	3	0	0	0	0	0	0
	Bowels, Inflammation of	5	4	1	0	0	0	0	0	0	13	0	0	0	0	0
	Bronchitis	52	49	51	57	67	88	100	46	60	75	20	67	43	50	0
	Cerebro-spi. Meningitis	7	2	0	0	0	0	0	0	0	0	0	0	0	0	0
	Cholera Infantum	11	12	10	0	0	0	0	0	0	25	40	100	0	0	0
	Cholera Morbus	15	12	9	0	0	0	0	0	0	13	30	33	0	25	22
	Consumption, Pul.	33	28	70	57	67	50	100	84	100	88	80	100	57	25	22
	Croup, Membranous	7	3	0	0	0	0	0	0	0	0	0	0	0	0	0
	Diphtheria	21	5	8	14	0	0	0	0	0	0	0	0	14	100	11
	Diarrhea	42	35	27	9	33	0	0	8	10	50	90	100	29	0	22
	Dysentery	16	14	5	0	17	0	0	8	0	0	10	33	0	0	0
	Erysipelas	27	22	22	14	50	83	80	31	40	0	0	0	14	0	0
	Fever, Intermittent	64	56	9	14	17	0	0	0	10	13	0	0	43	0	11
	Fever, Remittent	50	39	25	43	33	17	20	23	30	75	0	0	29	25	0
	Fever, Typhoid (enteric)	8	6	8	0	0	0	0	0	10	25	0	0	43	25	0
	Fever, Typo-malarial	24	13	3	14	0	0	0	8	0	0	0	0	14	0	0
	Influenza	12	12	35	57	83	100	100	46	10	0	10	0	0	0	33
	Kidney, Inflammation of	7	9	11	0	0	0	0	15	30	38	20	0	0	0	0
	Measles	15	12	5	0	0	0	20	28	0	0	0	0	0	0	0
	Neuralgia	54	51	61	29	83	50	100	62	70	75	50	100	71	50	33
	Pleuritis	3	3	2	0	0	0	0	0	0	13	0	0	0	0	11
	Pneumonia	31	29	25	14	50	0	80	46	20	13	10	33	14	25	11
	Puerperal Fever	5	5	2	0	0	0	40	0	0	0	0	0	0	0	0
	Rheumatism	59	59	70	86	83	100	100	69	90	63	90	67	43	50	11
	Scarlatina	10	10	16	14	0	17	40	23	10	38	0	0	43	0	0
	Small-pox	0.8	0.6	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tonsillitis	54	47	40	43	67	67	100	23	40	63	30	0	43	25	0
	Whooping-cough	13	10	7	0	0	0	0	0	10	0	20	100	0	0	0

	Av. for Tab. Dis. Rep. Pr..	32	27	27	38	38	34	31	30	24	27	32	32	29	22	27
Bay and Eastern Division.*	Brain, Inflammation of..	6	5	7	19	23	14	9	9	0	0	0	0	0	3	5
	Bowels, Inflammation of.	21	21	20	10	16	20	26	17	4	16	33	25	24	22	19
	Bronchitis	69	62	67	87	87	77	71	65	46	52	47	57	67	61	78
	Cerebro-spi. Meningitis..	5	3	10	3	23	17	3	13	0	8	13	7	12	6	11
	Cholera Infantum	17	16	16	0	0	0	0	0	0	20	53	66	33	3	0
	Cholera Morbus	21	19	18	0	0	9	11	4	21	32	63	43	24	3	3
	Consumption, Pul.	66	55	67	84	81	80	80	78	63	64	63	57	55	56	54
	Croup, Membranous	9	4	8	19	19	14	3	0	0	0	0	0	3	14	19
	Diphtheria	23	10	11	13	13	9	11	9	13	4	7	11	13	8	11
	Diarrhea	49	44	44	16	26	37	40	35	17	64	93	93	61	28	8
	Dysentery	19	16	16	0	13	9	11	4	4	20	37	45	30	11	0
	Erysipelas	24	21	20	39	45	34	23	9	4	4	20	9	15	14	19
	Fever, Intermittent	69	47	28	26	32	31	34	35	33	32	30	32	18	22	19
	Fever, Remittent	41	28	15	19	6	11	14	0	0	0	13	23	42	14	24
	Fever, Typhoid (enteric).	10	10	20	16	28	11	17	0	17	24	23	27	33	25	14
	Fever, Typho-malarial	27	20	8	0	3	9	0	0	0	0	13	20	24	14	5
	Influenza	42	38	52	84	81	86	86	65	33	24	23	20	21	28	76
	Kidney, Inflammation of.	22	21	15	32	32	29	23	9	4	8	13	11	9	6	5
	Measles	15	13	15	10	29	49	26	35	17	4	7	0	3	6	0
	Neuralgia	70	67	66	90	81	86	74	65	58	40	60	66	55	61	54
	Pleuritis	26	26	28	42	42	43	26	22	17	12	0	20	30	36	32
	Pneumonia	38	30	29	68	52	43	26	26	0	16	3	7	27	22	51
	Puerperal Fever	5	5	3	3	0	3	9	4	0	0	0	2	3	3	3
	Rheumatism	74	69	67	87	74	71	71	74	63	60	63	64	70	50	59
	Scarlatina	16	8	16	10	16	14	14	13	17	24	30	16	12	19	11
	Small-pox	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tonsillitis	50	42	42	55	61	66	46	48	21	32	33	30	36	38	48
	Whooping-cough	22	15	9	0	0	9	9	0	4	0	3	11	21	22	14

		26	24	25	34	34	35	31	28	24	25	26	26	27	27	27
Central Division.*	Brain, Inflammation of..	5	4	4	2	8	8	4	2	2	12	4	0	1	3	5
	Bowels, Inflammation of.	13	15	13	8	4	3	8	8	11	12	20	27	17	13	20
	Bronchitis	58	54	59	90	80	85	87	65	45	33	30	32	42	61	72
	Cerebro-spi. Meningitis..	4	4	1	0	2	0	1	8	0	0	0	2	0	0	0
	Cholera Infantum	10	9	7	0	0	0	0	0	2	5	17	15	26	10	0
	Cholera Morbus	14	14	17	4	0	7	1	6	11	26	57	40	19	11	9
	Consumption, Pul.	56	47	50	58	30	51	67	81	56	47	35	38	43	48	43
	Croup, Membranous	3	3	7	13	14	17	12	4	4	2	0	0	3	10	8
	Diphtheria	17	6	5	10	10	0	3	2	7	3	4	1	16	6	4
	Diarrhea	42	43	49	37	20	36	28	21	33	67	94	88	72	55	24
	Dysentery	15	15	13	2	2	3	1	12	2	14	33	40	28	6	5
	Erysipelas	20	23	17	19	24	29	20	27	13	12	11	12	13	23	11
	Fever, Intermittent	67	52	44	58	50	37	45	42	51	47	56	42	41	43	29
	Fever, Remittent	44	38	34	37	36	32	39	37	25	27	35	32	46	33	30
	Fever, Typhoid (enteric).	11	7	6	0	0	0	1	0	0	0	6	15	20	15	9
	Fever, Typho-malarial	17	12	3	0	0	0	1	0	2	2	6	4	12	5	0
	Influenza	36	36	64	88	92	97	97	81	49	39	24	38	51	52	71
	Kidney, Inflammation of.	21	20	29	23	26	20	25	33	24	27	33	23	36	35	38
	Measles	10	10	7	4	2	5	20	19	20	6	2	1	0	2	3
	Neuralgia	64	70	74	77	86	92	80	79	71	70	56	62	64	79	75
	Pleuritis	13	13	20	29	24	19	29	17	16	12	13	12	16	23	34
	Pneumonia	30	25	27	40	52	49	46	27	18	6	15	12	12	18	42
	Puerperal Fever	5	5	3	4	0	5	0	6	2	0	2	4	4	3	3
	Rheumatism	61	64	73	83	82	88	83	88	69	65	52	58	71	69	79
	Scarlatina	11	7	4	12	12	3	7	4	0	0	2	5	1	3	1
	Small-pox	0.3	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tonsillitis	41	42	48	73	72	71	58	44	33	35	20	32	38	48	62
	Whooping-cough	16	12	7	10	10	8	1	4	5	3	17	8	3	10	7

* † d See page 99. ‡ Inflammation of kidney was not compiled until 1884. For inflam. of brain and inflam. of bowels, an average for the 11 years, 1880-90; for neuralgia and tonsillitis, an av. for the 12 years 1879-90; pleuritis was not compiled until 1888; for other diseases, and for the av. line, an av. for the 14 years 1877-90.

TABLE 2.—CONTINUED.—*Diseases in the Southwestern and Southern Central Divisions of the State, for the years 1877-90, also for the years 1886-90, for the Year and by Months in 1891.—Indicating what Per Cent of the Weekly Reports Received Stated the Presence of the Diseases Named.*[d]

Division.*	Diseases.	1877-90.‡	1886-90.	1891.†	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Southwestern Division.*	Av. for Tab. Dis. } Rep. Pres. }	27	25	24	30	37	31	32	25	23	23	35	31	31	33	32
	Brain, Inflam. of	4	4	1	0	0	3	0	10	0	0	0	2	0	0	0
	Bowels, Inflam. of	11	12	13	8	6	3	5	21	15	7	8	19	18	26	18
	Bronchitis	53	51	64	79	81	89	67	67	49	48	41	65	63	66	70
	Cerebro-spinal men.	2	1	1	3	0	0	0	2	2	4	0	0	0	3	3
	Cholera Infantum	18	14	19	3	0	0	0	6	11	37	51	71	23	0	5
	Cholera Morbus	16	16	19	8	0	6	0	4	13	46	54	54	23	3	0
	Consumption, Pul.	68	58	53	74	61	53	56	44	38	44	46	56	48	61	58
	Croup, Membranous	4	3	3	3	8	3	3	2	0	2	0	2	3	5	8
	Diphtheria	11	5	2	10	0	0	3	0	0	0	0	0	5	0	5
	Diarrhœa	38	36	39	18	14	11	13	33	26	50	82	83	63	26	35
	Dysentery	15	17	15	8	8	0	3	2	4	13	46	46	28	5	8
	Erysipelas	22	23	24	44	36	25	31	17	28	11	21	15	15	32	20
	Fever, Intermittent	71	50	40	31	28	33	31	29	34	37	54	60	60	47	30
	Fever, Remittent	45	32	36	51	44	33	31	21	19	31	49	44	48	39	25
	Fever, Typhoid (ent.)	6	5	3	0	0	0	0	2	0	2	8	10	10	0	0
	Fever, Typho-mal.	22	23	4	3	3	8	0	0	0	2	0	6	23	8	0
	Influenza	42	37	55	77	89	86	90	69	30	22	18	21	50	58	80
	Kidney, Inflam. of	13	13	15	8	19	8	13	23	15	11	13	15	13	21	23
	Measles	11	12	11	0	0	14	38	31	21	13	0	2	0	0	0
	Neuralgia	71	64	62	64	58	58	67	50	62	59	62	60	65	71	73
	Pleuritis	18	18	19	26	33	17	23	15	15	7	5	15	25	34	23
	Pneumonia	31	31	26	59	50	56	56	27	6	4	3	4	10	26	33
	Puerperal Fever	3	4	4	8	14	0	3	2	2	4	0	2	3	3	8
	Rheumatism	75	75	76	79	83	78	77	77	70	65	74	63	85	79	90
	Scarlatina	12	8	5	10	0	17	5	0	4	0	0	8	10	0	3
	Small-pox	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tonsillitis	44	44	44	51	53	39	56	48	32	26	23	33	53	53	73
	Whooping-cough	15	15	10	5	11	3	13	8	6	9	5	13	18	21	13

Division.*	Diseases.	1877-90.‡	1886-90.	1891.†	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Southern Central Division.*	Av. for Tab. Dis. } Rep. Pres. }	28	27	26	28	29	33	34	31	24	30	30	27	28	28	27
	Brain, Inflam. of	4	5	3	4	5	6	3	3	2	7	2	2	5	0	1
	Bowels, Inflam. of	14	14	17	19	19	18	12	10	8	22	29	17	15	23	10
	Bronchitis	64	60	62	82	73	84	78	64	41	47	42	48	45	63	70
	Cerebro-spinal men.	4	2	2	1	6	0	4	0	4	7	0	1	0	0	0
	Cholera Infantum	11	11	9	4	3	1	1	5	4	13	31	29	8	6	1
	Cholera Morbus	18	17	16	9	9	4	11	7	14	38	45	32	17	6	3
	Consumption, Pul.	59	50	47	40	39	45	49	45	43	48	48	47	47	54	50
	Croup, Membranous	3	3	2	3	0	7	0	2	0	0	0	1	0	2	5
	Diphtheria	13	9	5	7	2	6	0	3	4	15	2	9	2	6	5
	Diarrhœa	47	48	52	46	47	40	35	41	41	63	94	81	70	37	31
	Dysentery	18	19	23	9	9	10	11	16	4	25	50	48	37	22	20
	Erysipelas	18	19	15	12	20	19	16	17	14	12	10	6	15	17	24
	Fever, Intermittent	68	47	42	42	38	45	49	45	47	55	40	48	47	39	29
	Fever, Remittent	50	40	36	28	31	36	38	33	18	38	43	46	44	46	28
	Fever, Typhoid (ent.)	8	7	9	6	3	0	1	0	0	0	8	15	33	18	8
	Fever, Typho-mal.	17	12	6	7	3	3	5	2	0	0	5	11	17	7	6
	Influenza	40	47	58	88	91	93	96	76	49	30	19	26	20	39	79
	Kidney, Inflam. of	17	17	18	19	17	18	15	26	14	18	16	14	15	20	20
	Measles	10	8	12	12	13	25	24	31	35	17	5	0	0	0	0
	Neuralgia	71	74	77	76	83	84	88	83	78	83	79	67	62	68	79
	Pleuritis	18	18	17	28	22	31	34	34	4	5	5	3	19	13	13
	Pneumonia	34	30	25	42	41	42	46	34	10	9	6	4	14	21	39
	Puerperal Fever	3	2.5	2	4	8	0	0	0	2	2	0	1	2	0	2
	Rheumatism	73	77	77	79	73	82	93	86	76	78	71	71	74	74	73
	Scarlatina	14	12	12	15	20	13	23	24	10	2	13	12	5	6	7
	Small-pox	0.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tonsillitis	43	50	60	67	67	72	77	66	55	53	48	48	53	54	65
	Whooping-cough	20	15	5	3	2	3	4	2	2	7	8	4	8	10	8

*, †, d. See page 99. ‡ Inflammation of kidney was not compiled until 1884. For inflammation of brain and inflammation of bowels, an average for the 11 years, 1880-90; for neuralgia and tonsillitis an average for the 12 years 1879-90; pleuritis was not compiled until 1888; for other diseases and for average line an average for the 14 years 1877-90.

TABLE 2.—CONTINUED.—*Diseases in the Southeastern Division of the State, for the years 1877-90, also for the years 1886-90, for the year and by months in 1891,—Indicating what Per Cent of the Weekly Reports Received stated the Presence of the Diseases Named.*[d]

Division.*	Diseases.	1877-90.‡	1886-90.	1891.†	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Southeastern Division.*	Av. for Tab. Dis. Rep. Pres.	83	26	21	27	27	25	31	26	21	22	26	22	21	19	22
	Brain, Inflammation of	13	9	2	0	5	7	0	0	2	5	0	3	0	2	3
	Bowels, Inflammation of	19	16	9	4	2	0	13	14	18	8	7	13	10	14	6
	Bronchitis	68	68	53	77	79	79	83	66	37	29	24	35	37	42	63
	Cerebro-spinal Meningitis	7	4	1	2	0	4	2	0	2	0	0	1	0	2	0
	Cholera Infantum	15	11	10	0	2	0	0	0	5	21	47	29	10	5	0
	Cholera Morbus	21	16	14	4	3	4	0	7	11	30	54	32	15	5	0
	Consumption, Pulmonary	76	66	41	61	57	59	56	33	34	41	36	34	32	24	26
	Croup, Membranous	11	7	2	9	0	7	2	2	0	0	0	0	0	3	3
	Diphtheria	26	13	8	4	2	5	8	5	5	4	3	9	19	17	14
	Diarrhea	51	47	46	27	17	27	30	40	55	70	80	81	47	32	28
	Dysentery	24	19	11	4	5	5	5	3	11	16	36	28	10	3	2
	Erysipelas	33	31	18	30	28	20	19	21	16	11	12	14	10	17	18
	Fever, Intermittent	62	43	31	23	17	14	22	34	27	48	53	45	36	31	17
	Fever, Remittent	40	29	19	20	24	20	14	19	19	21	32	19	15	12	9
	Fever, Typhoid (enteric)	22	16	11	5	7	7	0	7	5	10	15	12	10	22	28
	Fever, Typho-malarial	22	12	10	21	10	5	0	9	10	8	15	10	20	8	0
	Influenza	41	33	50	77	74	75	100	76	39	22	12	10	24	31	77
	Kidney, Inflammation of	26	28	15	7	7	11	30	22	24	16	10	16	7	19	6
	Measles	16	11	15	16	21	41	40	26	21	10	8	0	0	0	3
	Neuralgia	57	55	51	59	55	52	56	62	60	49	34	45	47	46	45
	Pleuritis	18	18	17	28	28	27	25	24	18	10	2	17	10	8	12
	Pneumonia	39	28	20	34	45	43	48	31	5	4	8	0	7	10	22
	Puerperal Fever	9	7	3	5	0	7	2	2	6	0	0	6	3	0	0
	Rheumatism	73	71	64	80	79	70	81	72	68	52	51	51	59	56	57
	Scarlatina	24	14	7	7	12	5	3	9	2	3	3	8	12	15	9
	Small-pox	3.1	1.4	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tonsillitis	48	48	37	45	52	36	44	43	35	27	25	27	36	39	42
	Whooping-cough	24	16	5	0	0	2	8	7	2	7	22	6	3	3	2

*, †, d. See page 99. ‡ Inflammation of kidney was not compiled until 1884. For inflammation of brain and inflammation of bowels, an average for the 11 years 1880-90; for neuralgia and tonsillitis an average for the 12 years 1879-90; pleuritis was not compiled until 1888; for other diseases and for average line and average for the 14 years 1877-90.

TABLE 2.—CONTINUED.—*Diseases in the Southwestern and Southern Central Divisions of the State, for the years 1877-90, also for the years 1886-90, for the Year and by Months in 1891.—Indicating what Per Cent of the Weekly Reports Received Stated the Presence of the Diseases Named.*[d]

Division.*	Diseases.	1877-90.‡	1886-90.	1891.†	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Southwestern Division.*	Av. for Tab. Dis. Rep. Pres.	27	25	24	30	37	31	32	25	23	23	35	31	31	33	32
	Brain, Inflam. of	4	4	1	0	0	3	0	10	0	0	0	2	0	0	0
	Bowels, Inflam. of	11	12	13	8	6	3	5	21	15	7	8	19	18	26	18
	Bronchitis	53	51	64	79	81	89	67	67	49	48	41	65	63	66	70
	Cerebro-spinal men.	2	1	1	3	0	0	0	2	2	4	0	0	0	3	3
	Cholera Infantum	18	14	19	3	0	0	0	6	11	37	51	71	23	0	5
	Cholera Morbus	16	16	19	8	0	6	0	4	13	46	54	54	23	3	0
	Consumption, Pul.	68	58	53	74	61	53	56	44	38	44	46	56	48	61	58
	Croup, Membranous	4	3	3	3	8	3	3	2	0	2	0	2	3	5	8
	Diphtheria	11	5	2	10	0	0	3	0	0	0	0	0	5	0	5
	Diarrhea	38	36	39	18	14	11	13	33	26	50	82	83	63	26	35
	Dysentery	15	17	15	8	8	0	3	2	4	13	46	46	28	5	8
	Erysipelas	22	23	24	44	36	25	31	17	28	11	21	15	15	32	20
	Fever, Intermittent	71	50	40	31	28	33	31	29	34	37	54	60	60	47	30
	Fever, Remittent	45	32	36	51	44	33	31	21	19	31	49	44	48	39	25
	Fever, Typhoid (ent.)	6	5	3	0	0	0	0	2	0	2	8	10	10	0	0
	Fever, Typho-mal.	22	23	4	3	3	8	0	0	0	2	0	6	23	8	0
	Influenza	42	37	55	77	89	86	90	69	30	22	18	21	50	58	80
	Kidney, Inflam. of	13	13	15	8	19	8	13	23	15	11	13	15	13	21	23
	Measles	11	12	11	0	0	14	38	31	21	13	0	2	0	0	0
	Neuralgia	71	64	62	64	58	58	67	50	62	59	62	60	65	71	73
	Pleuritis	18	18	19	26	33	17	23	15	15	7	5	15	25	34	23
	Pneumonia	31	31	26	59	50	56	56	27	6	4	3	4	10	26	33
	Puerperal Fever	3	4	4	8	14	0	3	2	2	4	0	2	3	3	8
	Rheumatism	75	75	76	79	83	78	77	77	70	65	74	63	85	79	90
	Scarlatina	12	8	5	10	0	17	5	0	4	0	0	8	10	0	3
	Small-pox	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tonsillitis	44	44	44	51	53	39	56	48	32	26	23	33	53	53	73
	Whooping-cough	15	15	10	5	11	3	13	8	6	9	5	13	18	21	13

Division.*	Diseases.	1877-90.‡	1886-90.	1891.†	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Southern Central Division.*	Av. for Tab. Dis. Rep. Pres.	28	27	26	28	29	33	34	31	24	30	30	27	28	28	27
	Brain, Inflam. of	4	5	3	4	5	6	3	3	2	7	2	2	5	0	1
	Bowels, Inflam. of	14	14	17	19	19	18	12	10	8	22	29	17	15	23	10
	Bronchitis	64	60	62	82	73	84	78	64	41	47	42	48	45	63	70
	Cerebro-spinal men.	4	2	2	1	6	0	4	0	4	7	0	1	0	0	0
	Cholera Infantum	11	11	9	4	3	1	1	5	4	13	31	29	8	6	1
	Cholera Morbus	18	17	16	9	9	4	11	7	14	38	45	32	17	6	3
	Consumption, Pul.	59	50	47	40	39	45	49	45	43	48	48	47	47	54	50
	Croup, Membranous	3	3	2	3	0	7	0	2	0	0	0	1	0	2	5
	Diphtheria	13	9	5	7	2	6	0	3	4	15	2	9	2	6	5
	Diarrhea	47	48	52	46	47	40	35	41	41	63	94	81	70	37	31
	Dysentery	18	19	23	9	9	10	11	16	4	25	50	48	37	22	20
	Erysipelas	18	19	15	12	20	19	16	17	14	12	10	6	15	17	24
	Fever, Intermittent	68	47	42	42	38	45	49	45	47	55	40	48	47	39	29
	Fever, Remittent	50	40	36	28	31	36	38	33	18	38	43	46	44	46	28
	Fever, Typhoid (ent.)	8	7	9	6	3	0	1	0	0	0	8	15	38	18	8
	Fever, Typho-mal.	17	12	6	7	3	3	5	2	0	0	5	11	17	7	6
	Influenza	40	47	58	88	91	93	96	76	49	30	19	26	20	39	79
	Kidney, Inflam. of	17	17	18	19	17	18	15	26	14	18	16	14	15	20	20
	Measles	10	8	12	12	13	25	34	31	35	17	5	0	0	0	0
	Neuralgia	71	74	77	76	83	84	88	83	78	83	79	67	62	68	79
	Pleuritis	18	18	17	28	22	31	34	34	4	5	5	3	19	13	13
	Pneumonia	34	30	25	42	41	42	46	34	10	0	6	4	14	21	39
	Puerperal Fever	3	2.5	2	4	8	0	0	0	2	2	0	1	2	0	2
	Rheumatism	72	77	77	79	73	82	93	86	76	78	71	71	74	74	73
	Scarlatina	14	12	12	15	20	13	23	24	10	2	13	12	5	6	7
	Small-pox	0.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tonsillitis	43	50	60	67	67	72	77	66	55	53	48	48	53	54	65
	Whooping-cough	20	15	5	3	2	3	4	2	2	7	8	4	8	10	8

*, †, d. See page 99. ‡ Inflammation of kidney was not compiled until 1884. For inflammation of brain and inflammation of bowels, an average for the 11 years, 1880-90; for neuralgia and tonsillitis an average for the 12 years 1879-90; pleuritis was not compiled until 1888; for other diseases and for average line an average for the 14 years 1877-90.

TABLE 2.—CONTINUED.—*Diseases in the Southeastern Division of the State, for the years 1877-90, also for the years 1886-90, for the year and by months in 1891,—Indicating what Per Cent of the Weekly Reports Received stated the Presence of the Diseases Named.*[d]

Division.*	Diseases.	1877-90.‡	1886-90.	1891.†	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Southeastern Division.*	**Av. for Tab. Dis. Rep. Pres.**	83	26	21	27	27	25	31	26	21	22	26	22	21	19	22
	Brain, Inflammation of	13	9	2	0	5	7	0	0	2	5	0	3	0	2	3
	Bowels, Inflammation of	19	16	9	4	2	0	13	14	18	8	7	13	10	14	6
	Bronchitis	68	68	58	77	79	79	88	66	37	29	24	35	37	42	63
	Cerebro-spinal Meningitis	7	4	1	2	0	4	2	0	2	0	0	1	0	2	0
	Cholera Infantum	15	11	10	0	2	0	0	0	5	21	47	29	10	5	0
	Cholera Morbus	21	16	14	4	3	4	0	7	11	30	54	32	15	5	0
	Consumption, Pulmonary	76	66	41	61	57	59	56	38	34	41	36	34	32	24	26
	Croup, Membranous	11	7	2	9	0	7	2	2	0	0	0	0	0	3	3
	Diphtheria	26	13	8	4	2	5	8	5	5	4	3	9	19	17	14
	Diarrhea	51	47	46	27	17	27	30	40	55	70	80	81	47	32	28
	Dysentery	24	19	11	4	5	5	5	3	11	16	36	23	10	3	2
	Erysipelas	33	31	18	30	28	20	19	21	16	11	12	14	10	17	18
	Fever, Intermittent	62	43	31	23	17	14	22	34	27	48	53	45	36	31	17
	Fever, Remittent	40	29	19	20	24	20	14	19	19	21	32	19	15	12	9
	Fever, Typhoid (enteric)	22	16	11	5	7	7	0	7	5	10	15	12	10	22	28
	Fever, Typho-malarial	22	12	10	21	10	5	0	9	10	8	15	10	20	8	0
	Influenza	41	33	50	77	74	75	100	76	39	22	12	10	24	31	77
	Kidney, Inflammation of	26	28	15	7	7	11	30	22	24	16	10	16	7	19	6
	Measles	16	11	15	16	21	41	40	26	21	10	8	0	0	0	3
	Neuralgia	57	55	51	59	55	52	56	62	60	49	34	45	47	46	45
	Pleuritis	18	18	17	28	28	27	25	24	18	10	2	17	10	8	12
	Pneumonia	39	28	20	34	45	43	48	31	5	4	8	0	7	10	22
	Puerperal Fever	9	7	3	5	0	7	2	2	6	0	0	6	3	0	0
	Rheumatism	73	71	64	80	79	70	81	72	68	52	51	51	59	56	57
	Scarlatina	24	14	7	7	12	5	3	9	2	3	3	8	12	15	9
	Small-pox	3.1	1.4	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tonsillitis	48	48	37	45	52	36	44	43	35	27	25	27	36	39	42
	Whooping-cough	24	16	5	0	0	2	8	7	2	7	22	6	3	3	2

*, †, d. See page 99. ‡ Inflammation of kidney was not compiled until 1884. For inflammation of brain and inflammation of bowels, an average for the 11 years 1880-90; for neuralgia and tonsillitis an average for the 12 years 1879-90; pleuritis was not compiled until 1888; for other diseases and for average line and average for the 14 years 1877-90.

TABLE 4.—*A Summary for the Year 1891, relative to Diseases in each of the Eleven Divisions of the State,†—indicating the prevalence as regards both Time and Area.*

Diseases.	Upper Peninsular Division.*				Northwestern Division.*				Northern Division.*				Northeastern Division.*				Northern Central Division.*			
	Per cent of Observers Reporting Presence of. b	Av. per cent of Weeks Reported Present where Present. c	Per cent of Reports Stating Presence of. d	Av. Order of Prevalence where Present. e	Per cent of Observers Reporting Presence of. b	Av. per cent of Weeks Reported Present where Present. c	Per cent of Reports Stating Presence of. d	Av. Order of Prevalence where Present. e	Per cent of Observers Reporting Presence of. b	Av. per cent of Weeks Reported Present where Present. c	Per cent of Reports Stating Presence of. d	Av. Order of Prevalence where Present. e	Per cent of Observers Reporting Presence of. b	Av. per cent of Weeks Reported Present where Present. e	Per cent of Reports Stating Presence of. d	Av. Order of Prevalence where Present. e	Per cent of Observers Reporting Presence of. b	Av. per cent of Weeks Reported Present where Present. c	Per cent of Reports Stating Presence of. d	Av. Order of Prevalence where Present. e
Av. for Tab. Dis. Reported Present	36	64	24	3.3	41	60	25	2.7	52	60	31	3.0	37	77	29	3.1	33	61	22	2.8
Brain, Inflammation of	11	28	3	5.2	31	33	11	3.1	56	44	25	3.7	14	69	9	3.8	0	0	0	0
Bowels, Inflammation of	28	36	10	4.3	56	56	30	3.4	50	35	17	3.7	36	68	24	3.8	4	25	1	4.0
Bronchitis	73	83	58	2.5	72	87	61	2.3	94	78	72	3.2	64	96	65	2.7	58	80	51	3.2
Cerebro-spinal Meningitis	4	36	1	4.3	3	60	2	3.0	22	33	8	3.8	7	80	4	4.5	0	0	0	0
Cholera Infantum	33	68	22	3.5	36	49	19	2.5	22	41	10	2.3	14	60	6	2.5	12	32	10	2.3
Cholera Morbus	32	64	20	4.0	31	29	9	2.5	11	25	3	2.5	14	42	5	2.8	27	35	9	2.3
Consumption, Pulmonary	42	88	35	4.0	69	79	52	4.1	83	84	71	3.4	46	81	37	3.6	73	90	70	2.4
Croup, Membranous	6	36	2	4.4	6	29	2	4.5	6	25	1	2.0	0	0	0	0	0	0	0	0
Diphtheria	14	39	6	3.5	3	40	2	2.0	0	0	0	0	0	0	0	0	19	41	8	3.2
Diarrhea	80	78	63	2.8	56	48	28	2.0	33	48	14	1.8	50	65	33	3.0	50	55	27	2.4
Dysentery	41	46	19	4.5	56	53	31	2.7	28	61	15	2.2	18	43	6	3.2	15	29	5	4.0
Erysipelas	33	37	12	5.1	39	53	20	3.2	89	77	71	3.3	50	61	32	4.6	38	51	22	3.4
Fever, Intermittent	5	65	3	3.3	33	55	18	3.0	89	50	44	3.1	68	89	62	2.8	27	30	9	3.1
Fever, Remittent	6	81	5	2.4	36	37	16	2.3	50	68	32	2.1	11	44	4	3.3	46	47	25	2.8
Fever, Typhoid (enteric)	51	82	42	3.0	8	40	3	2.0	0	0	0	0	0	0	0	0	15	50	8	3.0
Fever, Typho-malarial	6	50	3	1.6	0	0	0	0	0	0	0	0	7	50	3	2.5	12	27	3	2.0
Influenza	54	77	43	2.3	58	68	39	1.2	89	84	75	1.8	71	91	71	1.6	54	67	35	1.8
Kidney, Inflammation of	28	49	14	4.3	72	58	45	3.0	78	40	32	3.6	61	74	48	4.2	15	63	11	3.0
Measles	14	58	8	3.1	6	22	2	1.5	11	22	3	2.5	25	58	14	1.7	12	31	5	4.7
Neuralgia	84	68	57	3.1	64	65	40	1.9	88	74	64	2.8	71	92	68	1.9	81	78	61	2.5
Pleuritis	46	49	23	3.7	50	72	34	4.2	50	49	26	4.1	39	53	19	4.1	8	25	2	3.5
Pneumonia	51	43	22	4.2	75	66	51	3.1	50	43	21	3.8	43	66	28	4.3	50	47	25	3.3
Puerperal Fever	12	34	4	4.8	11	50	6	1.8	11	22	3	6.0	4	33	1	3.0	4	40	2	6.0
Rheumatism	84	66	55	3.4	86	76	67	2.0	94	74	69	2.2	64	97	65	2.6	88	79	70	2.3
Scarlatina	27	48	14	3.5	19	44	9	3.3	17	55	8	2.3	0	0	0	0	27	48	16	4.1
Small-pox	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tonsillitis	82	73	61	3.0	86	69	60	2.7	72	48	36	3.2	68	76	50	3.6	54	66	40	3.6
Whooping-cough	40	75	31	2.3	14	30	5	2.0	0	0	0	0	14	31	5	4.0	12	55	7	3.3

* For counties in each division, see Exhibit I., page 85. b, c, d, e. See foot-notes with these marks in Table 2, page 99.
† This page includes the Five Divisions of the State from which the fewest Weekly Reports were received.

TABLE 4.—CONTINUED.†

Diseases.	Western Division.*				Bay & Eastern Div.*				Central Division.*				Southwestern Div.*				Southern Central Division.*				Southeastern Div.*			
	Per cent of Observers Reporting Presence of. b	Av. per cent of Weeks Reported Present where Present. c	Per cent of Reports stating Presence of. d	Av. Order of Prevalence where Present. e	Per cent of Observers Reporting Presence of. b	Av. per cent of Weeks Reported Present where Present. c	Per cent of Reports stating Presence of. d	Av. Order of Prevalence where Present. e	Per cent of Observers Reporting Presence of. b	Av. per cent of Weeks Reported Present where Present. c	Per cent of Reports stating Presence of. d	Av. Order of Prevalence where Present. e	Per cent of Observers Reporting Presence of. b	Av. per cent of Weeks Reported Present where Present. c	Per cent of Reports stating Presence of. d	Av. Order of Prevalence where Present. e	Per cent of Observers Reporting Presence of. b	Av. Per cent of Weeks Reported Present where Present. c	Per cent of Reports stating Presence of. d	Av. Order of Prevalence where Present. e	Per cent of Observers Reporting Presence of. b	Av. per cent of Weeks Reported Present where Present. c	Per cent of Reports stating Presence of. d	Av. Order of Prevalence where Present. e
Average for Tabulated Diseases Reported Present.	42	70	29	4.0	37	70	27	3.6	38	66	25	3.4	38	64	24	3.2	38	69	26	3.6	35	60	21	2.7
Brain, Inflammation of	12	37	4	5.2	15	45	7	6.4	13	32	4	4.3	4	35	1	4.6	9	33	3	6.6	6	39	2	3.7
Bowels, Inflammation of	37	51	19	5.9	42	47	20	4.7	29	43	13	4.3	30	42	18	4.2	31	55	17	4.6	22	40	9	2.7
Bronchitis	74	76	56	3.6	75	87	67	2.8	75	77	59	3.0	81	79	64	2.8	77	80	62	2.6	71	73	53	2.1
Cerebro-spinal Meningitis	10	47	5	4.5	22	42	10	5.8	3	36	1	6.0	6	23	1	4.3	4	41	2	7.4	3	28	1	4.0
Cholera Infantum	27	75	19	4.1	21	71	16	3.6	16	42	7	4.1	30	61	19	3.2	20	43	9	5.4	22	45	10	2.5
Cholera Morbus	42	57	24	4.0	29	58	18	3.7	30	55	17	3.7	34	53	19	3.3	30	53	16	3.7	31	44	14	2.6
Consumption, Pulmonary	62	79	49	5.2	71	93	67	3.4	63	80	50	4.3	66	78	53	3.8	58	81	47	4.3	57	78	41	2.4
Croup, Membranous	17	52	9	4.2	17	48	8	6.0	13	52	7	4.4	11	26	3	4.5	6	33	2	5.7	6	32	2	4.4
Diphtheria	23	39	9	6.1	19	53	11	5.3	13	43	5	5.0	5	36	2	3.7	11	45	5	5.8	19	39	8	2.4
Diarrhea	77	73	55	3.0	61	69	44	2.8	67	71	49	2.8	61	64	39	2.9	73	72	52	2.8	67	67	46	2.5
Dysentery	35	61	21	3.6	26	58	16	3.8	24	51	13	3.4	28	50	15	3.7	38	59	28	4.5	26	41	11	3.2
Erysipelas	41	41	17	5.1	37	56	20	4.1	39	43	17	4.1	52	46	24	3.9	32	49	15	5.0	34	51	18	3.5
Fever, Intermittent	73	72	52	3.7	37	75	28	3.5	61	71	44	3.2	62	64	40	2.8	59	73	42	3.6	51	61	31	2.6
Fever, Remittent	74	78	57	3.6	24	61	15	3.8	51	66	34	3.1	52	68	36	3.0	51	69	36	3.7	39	47	19	3.0
Fever, Typhoid (Enteric)	14	54	7	4.4	28	70	20	3.4	10	59	6	4.9	7	45	3	2.9	15	58	9	4.2	16	67	11	2.5
Fever, Typho-malarial	17	61	10	4.5	18	46	8	3.9	7	35	3	3.4	10	44	4	2.9	12	51	6	5.0	18	55	10	2.9
Influenza	67	83	56	2.1	63	81	52	2.0	80	79	64	2.1	70	78	55	1.9	74	78	58	1.9	64	77	50	1.9
Kidney, Inflammation of	37	67	24	4.6	29	54	15	4.5	43	63	29	3.9	28	52	15	3.4	31	57	18	4.8	33	43	15	3.1
Measles	6	45	3	3.6	28	52	15	3.2	11	58	7	2.8	15	67	11	2.8	19	66	12	4.1	25	59	15	2.1
Neuralgia	90	87	78	3.2	72	90	66	2.6	88	84	74	3.0	84	74	62	2.8	94	81	77	2.5	74	67	51	2.9
Pleuritis	41	70	28	4.8	44	64	28	4.6	34	58	20	3.9	37	52	19	4.3	34	52	17	3.9	30	53	17	3.7
Pneumonia	54	71	39	4.2	48	60	29	4.5	44	60	27	4.4	46	57	26	3.9	40	63	25	4.4	39	52	20	3 4
Puerperal Fever	5	50	3	3.0	9	26	3	4.8	8	30	3	4.9	10	37	4	4.1	5	35	2	5.4	6	39	3	2.4
Rheumatism	78	78	60	3.7	73	88	67	2.9	92	78	73	3.0	91	83	76	2.8	93	88	77	2.9	84	74	64	2.8
Scarlatina	24	55	14	4.5	22	69	16	5.2	9	41	4	4.2	11	42	5	3.2	22	57	12	5.4	16	45	7	2.8
Small-pox	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tonsillitis	77	75	57	4.5	59	73	42	3.7	76	63	48	3.3	73	59	44	3.2	83	72	60	3.1	66	56	37	2.9
Whooping-cough	19	56	11	3.4	15	52	9	2.7	15	50	7	2.8	19	54	10	3.0	10	51	5	4.0	11	46	5	2.3

* For counties in each division, see Exhibit I., page 85. b, c, d, e. See foot-notes with these marks in Table 2, page 99.
† This page includes the Six Divisions of the State from which the most Weekly Reports were Received.

DISEASES IN MICHIGAN, ARRANGED IN ORDER OF PREVALENCE, THOSE WHICH CAUSE MOST SICKNESS FIRST.

EXHIBIT A.—*Order of Prevalence of twenty-eight diseases in Michigan, in the period of eleven years years 1881–1891, and in each of those years, and the average for the ten years 1881–1890, judging from the "Per Cent of Reports," which stated the presence of each of the diseases, in connection with the reported "Order of Prevalence" when and where each disease was present. (The method of rating diseases for this Exhibit is described and illustrated in a "Compiling Table" on pages 122 and 123 of the Annual Report for 1890.)*

Order.	Diseases arranged in order of greatest prevalence.	Aver. Order 1881-90.	1891.	1890.	1889.	1888.	1887.	1886.	1885.	1884.	1883.	1882.	1881.
1	Rheumatism	2	2	1	1	1	1	1	3	2	4	4	2
2	Neuralgia	2	3	2	2	2	2	2	1	1	2	2	4
3	Bronchitis	3	4	3	3	3	3	3	4	4	3	3	3
4	Intermittent Fever	3	8	8	5	4	5	4	2	3	1	1	1
5	Consumption, Pulm'y	5	7	6	6	5	4	5	5	5	5	5	7
6	Diarrhea	6	5	5	4	6	6	7	7	6	6	7	6
7	Tonsillitis	7	6	7	7	7	7	6	6	7	7	9	8
8	Influensa	8	1	4	8	8	8	8	8	9	8	8	9
9	Remittent Fever	8	9	9	9	9	9	9	9	8	9	6	5
10	Pneumonia	10	13	10	10	10	10	10	10	10	10	10	10
	(The Average Disease)	10	10	9	10	11	11	10	10	10	11	11	11
11	Erysipelas	13	19	15	12	11	11	11	11	12	12	15	17
12	Inflammati'n of Kidney	14	14	15	14	16	15	13	12	11	-----	-----	-----
13	Cholera Morbus	14	12	12	15	15	12	14	15	15	15	16	14
14	Whooping-cough	15	10	13	11	20	19	12	13	13	19	13	19
15	Dysentery	15	17	14	13	13	13	15	19	14	13	17	15
16	Typho-mal. Fever	15	20	19	17	14	14	16	14	17	14	12	13
17	Pleuritis	17	18	18	16	17	-----	-----	-----	-----	-----	-----	-----
18	Measles	17	11	11	22	12	16	22	25	23	11	20	11
19	Cholera Infantum	18	15	17	18	18	18	17	18	18	17	19	16
20	Diphtheria	19	23	23	24	23	20	19	16	20	18	11	12
21	Inflam. of Bowels	19	21	21	19	19	17	18	17	21	20	21	21
22	Scarlet Fever	20	22	22	21	22	22	20	20	19	16	14	20
23	Typhoid Fever, (ent.)	20	16	20	20	21	21	21	21	22	21	18	18
24	Puerperal Fever	23	25	24	23	24	23	24	24	16	24	22	24
25	Inflammation of Brain	24	26	27	27	27	24	23	22	24	22	23	25
26	Membranous Croup	25	24	25	26	26	25	25	23	26	23	25	23
27	Cerebro-spi. meningitis	25	27	26	25	25	26	26	26	25	25	24	22
28	Small-pox	27	28	28	28	28	27	27	27	27	26	26	26

In the years 1881–3 intermittent fever, in the years 1884–5 neuralgia, and in the years 1886–90 rheumatism, caused most sickness. This does not imply that there was any increase in rheumatism, because, as indicated

by this table, and is proved in the Diagram on that subject, intermittent fever decreased greatly.

The "Average Disease," of those reported, is included in this table, as a standard by which to judge the fluctuations; in 1890 it may be seen that the "Average Disease" was higher than usual by about one-tenth; this was due to the unusual prevalence of influenza, which, it may be seen, was twice as prevalent in 1890 as in the average year, the order in the average year being 8, while in 1890 it was 4. In 1891 influenza apparently caused more sickness than any other disease, and pneumonia decreased in apparent prevalence. It seems probable that this was only "apparent," pneumonia being, in many cases, reported as influenza. This would explain why in 1891 the "Average Disease"—the sickness from all causes—was only the same as the average of the preceding ten years.

DISEASES WHICH CAUSE MOST SICKNESS IN MICHIGAN.

This is shown in this Report in Exhibit A, and more specifically in Exhibit VI., in this Report, and in similar exhibits in previous Reports. The question is differently answered in different years. For many years after the compilation of weekly reports was begun, intermittent fever appeared to be the leading cause of sickness in Michigan. This is shown in Exhibit A. In 1884 neuralgia headed the list, with rheumatism second and intermittent fever third. In 1885 neuralgia again headed the list, intermittent fever second, rheumatism third. In 1886 rheumatism headed the list, neuralgia second, bronchitis third, and intermittent fever fourth. In 1887 rheumatism, neuralgia, bronchitis, and consumption of the lungs headed the list, in the order named. In 1888 rheumatism, neuralgia, bronchitis and intermittent fever, in the order named, headed the list. In 1889 rheumatism, neuralgia, bronchitis and diarrhea, in order named, headed the list. In 1890 rheumatism, neuralgia, bronchitis and influenza, in order named, appear to have caused most sickness in Michigan.

Nearly the same diseases appear above the average line each year. Pneumonia has appeared in this exhibit tenth in order for eleven years in succession, ending with 1890, and dropped to thirteenth in 1891. Some of the diseases of minor importance vary considerably in their order. Whooping-cough, for example, in 1881 and 1883 was nineteenth in order, and rose to twelfth in order in 1886, and dropped to nineteenth in 1887, to twentieth in 1888, and rose to eleventh in 1889, and dropped to thirteenth in 1890, and was tenth in 1891.

Exhibit VII. supplies data relative to what diseases caused most sickness in 1891 in each of several geographical divisions of Michigan. It may be seen that there is evidence that there are very great differences in the different parts of the State. Further evidence is very desirable, however, in order to reach conclusions on this important subject. The exhibit will be found of great interest to those who study it carefully, and in connection with previous reports.

COMMENTS ON EXHIBIT XIII., AND DIAGRAM 2.

The lines for 1891 in Exhibit XIII., are graphically represented in Diagrams 1, page 87, 2, page 122, and 4 on a subsequent page.

In Diagram 2, page 122, it may be seen that Influenza was very remarkably prevalent in the eight months, January—July and December of 1891.

How it differed in prevalence in 1891 from the preceding year may be seen by comparing Diagram 2 in this report with a similar diagram for the year 1890 in the Report of this Board for the year 1891, page 125.

EXHIBIT VI.—*Diseases from which there seems to have been the Most Sickness in Michigan in 1891, as indicated by the Per Cent of Weekly Reports Stating Presence of the Diseases, as studied in connection with the Average Order of Prevalence of said Diseases when Reported Present; also Order, Per Cent of Reports, and Average Order for the same Diseases in 1890, 1889, 1888 and 1887.*

1891.					1890.			1889.			1888.			1887.†		
	Order.*	Diseases in Order of Apparent Amount of Sickness in 1891, Most Prevalent Disease First.	Per cent of Reports Stating Pres'ce of.d	Av. Order of Prevalence when Present.e	Order.*	Per cent of Reports Stating Pres'ce of.d	Av. Order of Prevalence when Present.e	Order.*	Per cent of Reports Stating Pres'ce of.d	Av. Order of Prevalence when Present.e	Order.*	Per cent of Reports Stating Pres'ce of.d	Av. Order of Prevalence when Present.e	Order.*	Per cent of Reports Stating Pres'ce of.d	Av. Order of Prevalence when Present.e
	1	Influenza	55	2.0	4	53	2.2	8	32	2.4	8	32	2.7	8	33	3.0
	2	Rheumatism	69	2.9	1	71	2.9	1	65	2.8	1	66	3.0	1	69	3.2
	3	Neuralgia	66	2.8	2	67	2.7	2	63	2.6	2	62	2.7	2	67	2.8
	4	Bronchitis	60	2.7	3	65	2.6	3	58	2.7	3	59	2.7	3	55	3.0
	5	Diarrhea	47	2.7	5	44	2.9	4	45	2.8	6	41	3.0	6	48	3.0
	6	Tonsillitis	49	3.3	7	50	3.4	7	46	3.3	7	41	3.4	7	47	3.4
	7	Consumption, Pulmonary	49	3.8	6	52	3.5	6	48	3.5	5	49	3.6	4	51	3.7
	8	Intermittent Fever	36	3.2	8	41	2.9	5	43	2.6	4	45	2.6	5	48	2.8
	9	Remittent Fever	28	3.3	9	27	3.2	9	30	3.2	9	34	3.1	9	32	3.4
	(10)	Av. for 28 diseases	25	3.3	(9)	25	3.3	(10)	23	3.3	(11)	24	3.5	(11)	25	3.7
	10	Whooping-cough	9	2.9	13	9	3.2	11	16	3.3	20	9	3.9	19	14	4.2
	11	Measles	10	3.0	11	12	3.0	22	6	3.5	12	16	3.2	16	14	3.6
	12	Cholera Morbus	16	3.4	12	15	3.5	15	14	3.4	15	15	3.7	12	19	3.8
	13	Pneumonia	27	4.0	10	30	3.9	10	26	3.7	10	30	4.0	10	28	4.3
	14	Inflammation of Kidney	20	3.9	16	21	4.1	15	20	4.1	16	19	4.5	15	18	4.9
	15	Cholera Infantum	13	3.6	17	10	3.5	18	11	3.4	18	11	4.0	18	13	4.1

* Judging from the per cent of reports which stated presence of the diseases in connection with the order of prevalence when present. The method of rating diseases, as causes of sickness, as shown in Exhibits VI. and VII., is fully described and illustrated by a "Compiling table" on pages 122 and 123 of the Annual Report for the year 1890.

† For 1887 the average is for 27 diseases.

d This column states what per cent the number of reports stating presence of a disease is of the whole number of reports received for the time specified, from *all observers* in the State. It combines and states in a general way, an idea of the *time* a disease was prevalent, with an idea of the area of its prevalence.

e The disease having the greatest number of cases was to be marked 1, in the order; the disease having the next greatest number of cases, 2; and so on. Diseases not present were to be marked 0. The numbers in this column are found by dividing the totals of the Order of Prevalence columns, in Table 3 (omitted in this report), by the number of men who reported the disease present. The column is, therefore, an average, not for all the localities represented, but only for those at which the given disease was reported present. The numbers in the "Average" lines for this column are found by dividing the sum of the totals in the Order of Prevalence columns, in Table 3, for all diseases reported present, by the sum of the numbers of men who reported the different diseases present, thus counting each man once for every disease he reported present. As a rule, small numbers in this column indicate the large prevalence of the disease, and *vice versa*; but the greater the number of diseases reported present by each observer, from week to week, the greater will be the average in this column.

EXHIBIT VII.—*In Each of Eleven Geographical Divisions* of the State, the Fifteen Diseases from which there seems to have been the Greatest Amount of Sickness in 1891, as indicated by the Per Cent of Weekly Reports Stating Presence of each of 28 Leading Diseases, when Studied in concection with the Average Order of Prevalence of said diseases when reported present.*

	Order.†	Diseases in Order of Apparent Amount of Sickness. Most Prevalent Disease First.	Per Cent of Reports Stating Presence of.d	Av. Order of Prevalence when Pres.e	Diseases in Order of Apparent Amount of Sickness. Most Prevalent Disease First.	Per Cent of Reports Stating Presence of.d	Av. Order of Prevalence when Pres.e	Diseases in Order of Apparent Amount of Sickness. Most Prevalent Disease First.	Per Cent of Reports Stating Presence of.d	Av. Order of Prevalence when Pres.e
		UPPER PENINSULA DIV.*			NORTHWESTERN DIV.*			NORTHERN DIVISION.*		
More Sickness than Average for 28 Diseases in 1891.	1	Diarrhea	63	2.3	Rheumatism	67	2.0	Influenza	75	1.8
	2	Bronchitis	58	2.5	Bronchitis	61	2.3	Rheumatism	69	2.2
	3	Tonsillitis	61	3.0	Influenza	39	1.2	Bronchitis	72	3.2
	4	Influenza	43	2.3	Tonsillitis	60	2.7	Neuralgia	64	2.8
	5	Neuralgia	57	3.1	Neuralgia	40	1.9	Erysipelas	71	3.3
	6	Rheumatism	55	3.4	Pneumonia	51	3.1	Consumption, Pul.	71	3.4
	7	Whooping-cough	31	2.3	Diarrhea	28	2.0	Remittent Fever	32	2.1
	8	Typhoid Fever	42	3.0	Inflam. of kidney	45	3.0	Intermittent Fever.	44	3.1
	9	Typho-mal. Fever	3	1.6	Dysentery	31	2.7	Diarrhea	14	1.8
	(10)	Average	24	3.3						
Less than said Average.	10	Consumption, Pul.	35	4.0	Measles	2	1.5	Tonsillitis	36	3.2
	(11)				Average	25	2.7	Average	31	3.0
	11	Remittent Fever	5	2.4	Consumption, Pul.	52	4.1	Dysentery	15	2.2
	12	Cholera Infantum	22	3.5	Remittent Fever	16	2.3	Inflam. of kidney	32	3.6
	13	Pleuritis	23	3.7	Puerperal Fever	6	1.8	Cholera Infantum	10	2.3
	14	Measles	8	3.1	Cholera Infantum	19	2.5	Scarlet Fever	8	2.3
	15	Scarlet Fever	14	3.5	Whooping-cough	5	2.0	Membranous Croup	1	2.0
		NORTHERN CEN. DIV.*			WESTERN DIVISION.*			NORTHEASTERN DIV.*		
More Sickness than Average for 28 Diseases.	1	Rheumatism	70	2.3	Neuralgia	78	3.2	Influenza	71	1.6
	2	Consumption, Pul.	70	2.4	Influenza	56	2.1	Neuralgia	68	1.9
	3	Neuralgia	61	2.5	Diarrhea	55	3.0	Rheumatism	65	2.6
	4	Influenza	35	1.6	Rheumatism	60	3.7	Bronchitis	65	2.7
	5	Bronchitis	51	3.2	Remittent Fever	57	3.6	Intermittent Fever.	62	2.8
	6	Diarrhea	27	2.4	Bronchitis	56	3.6	Measles	14	1.7
	7	Tonsillitis	40	3.6	Intermittent Fever	52	3.7	Tonsillitis	50	3.6
	8	Remittent Fever	25	2.8	Tonsillitis	57	4.5	Diarrhea	33	3.0
	(9)	Average	22	2.8				Average	29	3.1
Less than said Average.	9	Cholera Infantum	10	2.3	Pneumonia	39	4.2	Consumation, Pul.	37	3.6
	10	Pneumonia	25	3.3	Consumption, Pul.	49	5.2	Inflam. of kidney	48	4.2
	(11)				Average	29	4.0			
	11	Cholera Morbus	9	2.3	Dysentery	21	3.6	Cholera Infantum	6	2.5
	12	Typho-mal. Fever	3	2.0	Cholera Morbus	24	4.0	Typho-mal. Fever	3	2.5
	13	Erysipelas	22	3.4	Whooping-cough	11	3.4	Cholera Morbus	5	2.8
	14	Inflam. of kidney	11	3.0	Pleuritis	28	4.8	Inflam. of bowels	24	3.8
	15	Typhoid Fever	8	3.0	Cholera Infantum	19	4.1	Dysentery	6	3.2

* The counties in each Division are stated in Exhibit I., page 85.
† Judging from the per cent of reports in connection with the "average order of prevalence where present." *d*, *e*. Foot-notes with these marks are on page 99.

EXHIBIT VII.—CONTINUED.

	Order. †	Diseases in Order of Apparent Amount of Sickness. Most Prevalent Disease First.	Per Cent of Reports Stating Presence of. d	Av. Order of Prevalence when Pres. e	Diseases in Order of Apparent Amount of Sickness. Most Prevalent Disease First.	Per Cent of Reports Stating Presence of. d	Av. Order of Prevalence when Pres. e	Diseases in Order of Apparent Amount of Sickness. Most Prevalent Disease First.	Per Cent of Reports Stating Presence of. d	Av. Order of Prevalence when Pres. e
		BAY AND EASTERN DIV.*			CENTRAL DIVISION.*			SOUTHWESTERN DIV.*		
More Sickness than Average for 28 Diseases.	1	Neuralgia	66	2.6	Influenza	64	2.1	Influenza	55	1.9
	2	Bronchitis	67	2.8	Neuralgia	74	3.0	Rheumatism	76	2.8
	3	Rheumatism	67	2.9	Rheumatism	73	3.0	Bronchitis	64	2.8
	4	Influenza	52	2.0	Bronchitis	59	3.0	Neuralgia	62	2.8
	5	Consumption, Pul.	67	3.4	Diarrhea	49	2.8	Intermittent Fever	40	2.8
	6	Diarrhea	44	2.8	Tonsillitis	48	3.3	Diarrhea	39	2.9
	7	Tonsillitis	42	3.7	Intermittent Fever	44	3.2	Tonsillitis	44	3.2
	8	Intermittent Fever	28	3.5	Remittent Fever	34	3.1	Remittent Fever	36	3.0
	9	Cerebro-spinal Men.	10	5.8	Consumption, Pul.	50	4.3	Consumption, Pul.	53	3.8
	(10)	Average	27	3.6	Average	25	3.4	Average	24	3.2
Less than Said Average.	10	Inflam. of Brain	7	6.4	Inflam. of Kidney	29	3.9	Measles	11	2.8
	11	Typhoid Fever (ent.)	20	3.4	Measles	7	2.8	Cholera Infantum	19	3.2
	12	Whooping-cough	9	2.7	Whooping-cough	7	2.8	Cholera Morbus	19	3.3
	13	Measles	15	3.2	Dysentery	13	3.4	Whooping-cough	10	3.0
	14	Cholera Morbus	18	3.7	Cholera Morbus	17	3.7	Typho-mal. Fever	4	2.9
	15	Cholera Infantum	16	3.6	Pleuritis	20	3.9	Typhoid Fev. (ent.)	3	2.9
		SOUTHERN CENTRAL DIV.*			SOUTHEASTERN DIVISION.*					
More Sickness than Average for 28 Diseases.	1	Neuralgia	77	2.5	Influenza	50	1.9			
	2	Rheumatism	77	2.9	Bronchitis	53	2.1			
	3	Influenza	58	1.9	Rheumatism	64	2.8			
	4	Bronchitis	62	2.6	Diarrhea	46	2.5			
	5	Tonsillitis	60	3.1	Consumption, Pulmonary	41	2.4			
	6	Diarrhea	52	2.8	Neuralgia	51	2.9			
	7	Intermittent Fever	42	3.6	Intermittent Fever	31	2.6			
	8	Consumption, Pul.	47	4.3	Tonsillitis	37	2.9			
	9	Remittent Fever	36	3.7	Measles	15	2.1			
	(10)	Average	26	3.6	Average	21	2.7			
Less than Said Average.	10	Cholera Morbus	16	3.7	Typhoid Fever (enteric)	11	2.5			
	11	Pneumonia	25	4.4	Diphtheria	8	2.4			
	12	Pleuritis	17	3.9	Cholera Infantum	10	2.5			
	13	Dysentery	23	4.5	Whooping-cough	5	2.3			
	14	Measles	12	4.1	Cholera Morbus	14	2.6			
	15	Inflam. of Bowels	17	4.6	Remittent Fevor	19	3.0			

* The counties in each division are stated in Exhibit I., page 85.
† Judging from the per cent of reports in connection with the "average order of prevalence where present." *d, e.* Foot-notes with these marks are on page 99.

EXHIBIT VIII.—*Names of Stations where were made the Observations of Meteorological Conditions used in Exhibit X., and following Exhibits, relative to Sickness and Meteorological Conditions in 1891, also the Temperature, Humidity, Cloudiness, Ozone, Velocity of Wind and Atmospheric Pressure, at each Station for which Observations of the given condition are included in the summary statement relative to that condition in said exhibit.*

Stations.* (Those of the U. S. Signal Service in Italics.)	Temperature.		Humidity.		Per Cent of Cloudiness.	Ozone.		Wind, Av. Velocity.	Atmospheric Pressure.		
	Av. Daily Range.	Average.	Relative.	Absolute.		Day.	Night.		Range. Monthly.	Range. Av. Daily.	Average.
Number of Stations Included in Average	16	11	8	8	11	8	8	8	10	10	11
Average	18.01	47.61	77	3.54	55	3.99	4.22	9.9	.866	.202	29.057
Marquette	15.23	.....	.....	.....	.....	.....	.....	9.4	.....	.....	.....
Manistee	13.00	.....	.....	.....	.....	.....	.....	8.5	.....	.....	.....
Traverse City	20.78	46.09	79	3.41	56	6.93	6.33	.....	.896	.200	29.321
Alpena	15.05	.....	.....	.....	.....	.....	.....	9.5	.....	.....	.....
Harrisville	17.92	43.57	.....	.....	61	3.84	4.44	.....	.935	.216	29.301
Grand Haven	14.50	.....	.....	.....	.....	.....	.....	10.9	.....	.....	.....
Port Huron	15.32	.....	.....	.....	.....	.....	.....	11.7	.....	.....	.....
Thornville	16.19	49.18	76	3.60	48	3.52	4.28	.....	.898	.210	28.955
Agricultural College	20.05	47.38	75	3.43	54	.....	.....	.....	.863	.196	29.100
Lansing, S. B. of H.	20.39	48.27	71	3.36	58	3.18	3.78	10.1	.841	.192	29.076
Albion	17.65	49.43	78	3.65	65	2.99	3.10	.....	.837	.191	28.958
Ann Arbor	17.77	48.71	80	3.44	56	2.38	2.48	8.4	.848	.197	29.028
Marshall	21.36	48.75	79	3.70	46	2.84	2.35	.....	.833	.189	29.023
Birmingham	21.09	49.04	78	3.72	56	.....	.....	.....	.874	.197	29 129
Detroit	15.29	.....	.....	.....	.....	.....	.....	10.5	.....	.....	.....
Rockland	26.60	42.76	.....	.....	54	6.34	7.06	.....	.....	.231	28.672
Battle Creek	.....	50.52	.....	.....	50	.....	.....	.....	.837	.....	29.063

* Observations of range of temperature were made with registering thermometers read and set at the Signal Service Stations as follows:—the maximum at the morning observation, the minimum at the evening observation, at 9 P. M. at Ann Arbor, and at 7 A. M. at other stations. For the ozone observations, the test-paper was exposed from 7 A. M. to 2 P. M. for the day observations, and from 9 P. M. to 7 A. M. for the night observations. The velocity of wind was recorded by registering anemometers. These subjects are treated by months in 1891 and for previous years, in an article on Meteorological Conditions in Michigan in 1891, on pages 1-78 of this Report.

EXHIBIT IX.—*Showing Comparisons between the Averages of certain Meteorological Conditions at Stations in Michigan in 1891, with those in preceding Years. (Abstracted from Exhibit 9, page 19; Exhibit 13, page 23; Exhibit 17, page 30; Exhibit 19, page 31; Exhibit 28, page 46; Exhibit 32, page 55; Exhibit 24, page 44; Exhibits 30 and 31, page 54; Exhibit 35, page 70 of this Report.)*

Meteorological Conditions.		Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Average Temperature	In 1891 higher than Av. for 14 years, 1877-90	1.52	5.73	3.90	.....	2.86	.....	2.01	.....	.32	4.62	.....	.....	6.42
	Lower	.....	.....	.....	.55	...	.60	.....	4.14	.....	.....	.44	1.92	.....
Av. Daily Range of Temp.	In 1891 greater than Av. for 12 years, 1879-90	.....	.....	.....	.....	.16	2.78	.63	.57	.....	1.84	1.16	.....	.76
	Less	.08	3.19	1.90	2.81	.....	.....	.....	...	.18	.....	.....	.71	.....
Absolute Humidity	In 1891 more than Av. for 14 years, 1877-90	.12	.34	.31	=	.44	.....	.47	....	.10	.57	.....	.....	.35
	Less	.....	.....	.....	=	.....	.25	.....	.78	.....	.....	.17	.01	.....
Relative Humidity	In 1891 more than Av. for 13 years, 1878-90	1	5	2	5	4	.....	=	.....	=	=	.....	5	.....
	Less	.....	.....	.....	.....	.....	3	=	2	=	=	1	.....	3
Rainfall	In 1891 more than Av. for 14 years, 1877-90	.....	.....	.56	.46	.....	.....	.....	.....	1.22	.....	.....	1.81	.....
	Less	3.31	.36	.....	....	.49	2.18	1.41	.68	.....	1.32	1.69	.....	.11
Velocity of Wind	In 1891 more than Av. for 9 years, 1882-90	.4	....	1.5	.9	.....	.4	.....	.7	....	.....	.7	1.1	2.5
	Less	.....	2.5	.....	.....	.2	.....	.5	.....	.5	.1	.....	.....	.....
Cloudiness	In 1891 more than Av. for 14 years, 1877-90	.....	9	6	9	....	.....	=	....	4	.....	.....	12	.....
	Less	1	.....	....	.....	1	10	=	3	.....	13	7	.....	18
Day Ozone	In 1891 more than Av. for 14 years, 1877-90	.70	.73	.61	.85	.55	.91	.81	1.06	.82	.77	.81	.85	.20
	Less	....	.....	.....	.....	.....	.....	....	....	.....	.....	.....	.....	.....
Night Ozone	In 1891 more than Av. for 14 years, 1877-90	.80	.14	.76	.83	1.06	.75	1.00	1.38	1.13	.80	.79	.20	.49
	Less	.....	.....	....	...	.....	.....	.....	.....	.....	.....	.....	.....	.....
Atmospheric Pressure	In 1891 more than Av. for 14 years, 1877-90	...	.....	.....	.....	.....	.004	.....	.....	.....	.....	.....	.....	.....
	Less	.100	.151	.195	.087	.115	.....	.094	.067	.120	.035	.076	.123	.148

CLIMATE AND SICKNESS.*

Exhibit X., page 120 (and similar exhibits in previous Reports) is an attempt to learn something of the relations of bronchitis to meteorological conditions, by noting whether each meteorological condition was above or below its average for the year, in months when more or in months when less bronchitis than the average for the year was reported. The months are arranged in order according to the prevalence of bronchitis; those months in which most bronchitis was reported being placed first in the column; those in which more bronchitis than the average was reported are placed above the average line, the others below that line. The meteorological conditions for each month are printed, in the proper columns, in the line for the month. The statements being thus arranged, it is easy to see whether the temperature, the velocity of the wind, or any other condition represented, was above its annual average in months when more than the average amount of bronchitis was reported, or *vice versa*.

That the comparisons may the more readily be held in mind, propositions have been made concerning the relations of bronchitis to meteorological conditions, grouping the conditions into two classes. The letters *a* and *b* in the Exhibit, mark exceptions to these propositions. It is not supposed that the propositions are in every case true concerning every disease; but the propositions serve to bring out the evidence of the exhibit on the subject in question. This evidence is appreciated by noting the number and force of the exceptions to the propositions, and also whether the exception is explained by facts shown in other columns. A summary of the evidence is presented in Exhibit XXIV., near the close of this article.

Exhibits and propositions similar to those relative to bronchitis, but relating to other diseases, are given on following pages. The propositions are differently stated for the summer diseases (beginning with the exhibit on diarrhea) and for the winter diseases (beginning with that on bronchitis), but they are not changed to fit the individual diseases under each class.

RELATIONS OF BRONCHITIS TO METEOROLOGICAL CONDITIONS.

PROPOSITION 1.—That in months when **more** than the average per cent of weekly reports stated the presence of bronchitis the average daily range of temperature, the relative humidity of the atmosphere, the average per cent of cloudiness, the ozone, the average velocity of the wind, the monthly and the average daily range of the barometer, and the average daily pressure of the atmosphere were **greater** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of bronchitis, these conditions were **less** than the average for the year. In Exhibit X., page 120, the letter *a* marks exceptions to this proposition for the year 1891.

PROPOSITION 2.—That in months when **more** than the average per cent of weekly reports stated the presence of bronchitis, the average daily temperature, and the absolute humidity of the atmosphere were **less** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of bronchitis these conditions were **greater** than the average for the year. In Exhibit X., page 120, the letter *b* marks exceptions to this proposition for months in 1891.

* The remarks under this head are applicable, also, by changing the name of the diseases to diseases treated in Exhibits XII., XIV., XV., XVI. and XVII., on the following pages. The meteorological data are from places indicated in Exhibit VIII., page 115.

PROPOSITION 3.—For those months which are not, as regards the absolute humidity of the atmosphere, exceptions to Proposition 2, it is true also that the quantity of vapor inhaled daily was **less** than the average, and the quantity exhaled daily in excess of that inhaled was **greater** than the average in months when **more** than the average per cent of reports stated presence of bronchitis; and that **more** vapor was inhaled and a **less** excess exhaled daily in months when the per cent of reports stating presence of bronchitis was **less** than the average.

Proposition 3 also holds true in relation to pneumonia, membranous croup, diphtheria, tonsillitis, influenza, scarlet fever, rheumatism, neuralgia, pleuritis and pulmonary consumption, treated in Exhibits XII., XIV., XV., XVI. and XVII., on following pages.

What per cent of weekly reports received in 1891 stated presence of bronchitis is graphically represented by months in Diagram 1, page 87.

The evidence of Exhibit X. confirms that of similar exhibits relating to bronchitis in previous years.

What per cent of the reports received stated presecce of bronchitis by months in each of the years 1877–91; also the averages for 1877–90 and 1886–90, and a comparison of 1891 with those averages are shown in Exhibit XI., page 119.

RELATIONS OF PNEUMONIA AND OTHER "COLD WEATHER" DISEASES TO METEOROLOGICAL CONDITIONS.

PROPOSITION 1.—That in months when **more** than the average per cent of weekly reports stated the presence of pneumonia (or of membranous croup, diphtheria, tonsillitis, influenza, scarlet fever, rheumatism, neuralgia, pleuritis or pulmonary consumption), the average daily range of temperature, the relative humidity of the atmosphere, the average per cent of cloudiness, the ozone, the average velocity of the wind, the monthly and the average daily range of the barometer, and the average daily pressure of the atmosphere, were **greater** than the average for the year; and in months when **less** than the average per cent of the reports stated the presence of pneumonia (or of the other diseases named), these conditions were **less** than the average for the year. In Exhibits XII.–XVII., on page 121 and the following pages, the letter *a* marks exceptions to this proposition for the year 1891.

PROPOSITION 2.—That in months when **more** than the average per cent of weekly reports stated the presence of pneumonia (or of membranous croup, diphtheria, tonsillitis, influenza, scarlet fever, rheumatism, neuralgia, pleuritis, or pulmonary consumption), the average daily temperature and the absolute humidity of the atmosphere were **less** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of pneumonia (or of the other diseases named), these conditions were **greater** than the average for the year. In Exhibits XII.–XVII., on page 121 and following pages, the letter *b* marks exceptions to this proposition for the year 1891.

What per cent of the weekly reports received in 1891 stated presence of pneumonia is graphically represented by months in Diagram 1, page 87. What per cent of weekly reports received stated presence of pneumonia, and of the other diseases mentioned in the two preceding propositions by months in the years 1890 and 1891, is stated in Exhibit XIII., page 123, where are also given an average for the fourteen years, 1877–1890, also for the five years, 1886–1890, and a comparison of 1891 with those averages.

From Exhibit XIII., it may be seen that pneumonia was considerably less in 1891 than the average for fourteen years, 1877–90, and also less in each month of 1891, than for the corresponding months of the fourteen years, 1877–1890.

The average temperature was slightly higher in 1891, than the average for the fourteen years, 1877–90. It was also higher in each month of 1891, except in March, May, July, October and November, than the average in corresponding months in the fourteen years, 1877–1890.

The absolute humidity was slightly more in 1891 than the average for the fourteen years, 1877–90. It was also more in each month of 1891, except May, July, October and November, than the average in corresponding months in the fourteen years, 1877–1890.

The relative humidity was more for the year and each month of the year 1891, except May, July, October and December, than the average for the thirteen years, 1878–1890.

EXHIBIT XI.—SICKNESS FROM BRONCHITIS, 1877-91.—*By Year and Months for each of the Fourteen Years, 1877–90, and for 1891, and an Average for the thirteen years, 1877–1890, also for the five years, 1886–1890; Stating on what per cent of the Weekly Reports received Bronchitis was reported present, and comparing the Per Cents for 1891, with the Averages for corresponding months in those Years.*

Years, Etc.	Annual Av.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Average 14 years, 1877-90	61	74	75	75	70	61	53	44	42	49	56	65	70
Average 5 years, 1886-90	59	67	71	71	67	61	51	44	42	48	58	63	66
1877	55	76	72	72	65	45	31	25	22	37	48	71	77
1878	64	77	75	74	71	65	56	41	45	55	60	73	81
1879	64	83	87	88	78	65	54	40	41	50	59	65	77
1880	64	81	84	82	68	59	57	44	45	46	57	67	72
1881	62	86	86	80	78	62	53	38	37	44	44	66	68
1882	65	73	70	75	74	70	62	51	44	57	59	71	71
1883	66	77	80	82	76	70	62	56	53	53	57	61	69
1884	61	71	71	71	65	59	56	49	47	50	56	69	70
1885	56	73	74	76	73	56	52	44	39	45	51	58	64
1886	56	71	69	71	65	57	45	40	37	41	51	61	65
1887	55	67	69	67	62	57	49	41	38	47	57	57	61
1888	59	63	76	74	68	69	55	41	39	49	59	59	65
1889	58	65	68	69	68	61	50	49	44	51	57	64	62
1890	65	71	74	76	74	66	56	50	52	54	65	73	79
1891	60	81	79	81	76	64	48	43	36	44	48	57	68
In 1891 Greater than Av. 1877-90	----	7	4	6	6	3	----	----	----	----	----	----	----
In 1891 Less than Av. 1877-90	1	----	----	----	----	----	5	1	6	5	8	8	2
In 1891 Greater than Av. 1886-90*	1	14	8	10	9	3	----	----	----	----	----	----	2
In 1891 Less than Av. 1886-90*	----	----	----	----	----	----	3	1	6	4	10	6	----

* This comparison is made because of change of plan of reports in May, 1885, as explained on pages 80-81.

EXHIBIT X.—BRONCHITIS.—*Stating for the Year and for each Month of the Year 1891, what Per Cent of the Weekly Reports of Sickness Stated Presence of Bronchitis, and what were the Meteorological Conditions as observed at Stations in Michigan.**

	Bronchitis.			Temperature, F.		Humidity of Air.§ Av. of 3 Daily Observations.		Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces.		Average Per Cent of Cloudiness.	Ozone, Relative Scale of 10.°		Av. Velocity of Wind, Miles per Hour by Anemometer.	Atmospheric Pressure, Inches Reduced to 32° F.		
	Months in Order of Greatest Per Cent of Weekly Reports Stating Presence of.	Per Cent of Weekly Reports Stating Presence of.	Av. Order of Prevalence where Present. †‡	Av. Daily Range by Registering Thermometers.	Average of Three Daily Observations.	Relative Per Cent of Saturation.	Absolute,—Grains of Vapor in a Cubic Foot of Air.	Inhaled.‖	Exhaled in excess of that Inhaled.¶		Day Observation, 7 A. M. to 2 P. M.	Night Observation, 9 P. M. to 7 A. M.		Range. Monthly and for Year.	Range. Av. Daily by 3 Daily Observations.**	Average Pressure.
More than Av. Per Cent of Bronchitis.	Jan.	81	2.4	a12.90	26.90	87	1.77	1.11	10.57	79	4.20	a 4.08	a 8.6	1.420	.241	a 29.041
	Mar.	81	2.6	a14.90	28.93	83	1.79	1.12	10.56	67	4.46	4.91	11.2	1.014	.259	29.063
	Feb.	79	2.5	a15.76	27.33	84	1.84	1.15	10.53	70	4.18	4.86	12.1	1.209	.337	a 28.993
	Apr.	76	2.6	19.57	47.11	a 74	3.19	1.99	9.69	a 50	4.02	4.83	9.9	a .677	a .192	a 29.025
	Dec.	68	2.5	a14.04	34.11	80	2.14	1.34	10.34	57	a 3.59	a 4.19	13.4	1.171	.277	a 29.028
	May	64	2.7	23.16	b55.40	a 66	b 3.67	2.29	9.39	a 40	4.40	4.41	a 9.7	a .489	a .130	29.118
Av.		60	2.7	18.01	47.61	77	3.54	2.21	9.57	55	3.99	4.22	9.9	.866	.202	29.057
Less than Av. Per Cent of Bronchitis.	Nov.	57	2.5	13.65	b34.57	a 84	b 2.32	1.45	10.23	a 80	3.45	3.51	a 11.7	a1.263	a .266	29.048
	June	48	2.6	a21.02	67.62	73	5.86	3.66	8.02	48	a 4.10	a 4.37	7.4	.634	.120	29.015
	Oct.	48	2.8	a18.18	49.01	75	b 3.37	2.11	9.57	52	3.85	3.92	a 10.1	.802	.200	a 29.105
	Sept.	44	3.1	a21.70	65.50	75	5.42	3.39	8.29	33	3.82	3.61	8.5	.592	.148	a 29.158
	July	43	3.1	a21.33	66 67	70	5.30	3.31	8.37	38	3.94	4.15	8.5	.543	.132	29.055
	Aug.	36	3.6	a19.93	68.16	73	5.83	3.64	8.04	47	3.92	3.92	7.2	.581	.123	29.085

a An exception to the proposition that more than the average per cent of weekly reports stated presence of bronchitis in months when the meteorological condition named at the head of the column was greater than the average for the year; and less in months when the same condition was less than the average. See proposition 1, relating to bronchitis, page 117.

b An exception to the proposition that more than the average per cent of weekly reports stated presence of bronchitis in months when the meteorological condition named at the head of the column was less than the average for the year and less in months when the same condition was greater than the average for the year. See proposition 2, relating to bronchitis, page 117.

* How many stations, and what stations are represented in the statements for each meteorological subject may be seen by referring to Exhibit VIII., page 115, in which the stations are named, and a statement for the year 1891, in relation to each meteorological subject, is given for each station included in the average for that subject. In Exhibit VIII., is also stated what time the tri-daily observations were made at each station. Additional statements relative to meteorological conditions may be found in an article on the Principal Meteorological Conditions in Michigan in 1891, on pages 1-78 of this Report.

† Explanations of statements in these columns, and other statements relative to the prevalence, in 1891, of the diseases under consideration, may be found in Tables 2, pages 98-107, and 4, pages 108-109, of this Report, and also in Diagrams 1 (p. 87), 2, 3, 4, and 5, on following pages. When the per cent of reports stated for any disease is the same for two months or for any month is the same as the average, the order of months in the first column of these exhibits has been determined by reference to fractional per cents.

‡ Small numbers in this column indicate great prevalence in the localities where the disease occurred, as compared with other diseases; and large numbers a less prevalence.

§ Calculated from readings of dry bulb and wet bulb thermometers.

‖ Calculated for 18 respirations per minute, of 20 cubic inches of air each.

¶ Assuming the air exhaled to be saturated with vapor at the temperature of 98° F., in which case each cubic foot of air contains 18.69 grains of vapor, and 18 respirations per minute, of 20 cubic inches of air each, make 11.68 Troy ounces of vapor exhaled daily. No correction has been made for expansion of air after it is inhaled.

** The daily range from which numbers in this column were computed is the difference between the highest and the lowest of the four observations taken during the 24 hours, namely, at 7 A. M., 2 P. M., 9 P. M. of one day, and 7 A. M. of the following day.

EXHIBIT XII.—PNEUMONIA AND MEMBRANOUS CROUP.—*Stating for the Year and for each Month of the Year 1891, what Per Cent of the Weekly Reports of sickness stated Presence of Pneumonia and Membranous Croup, and what were the Meteorological Conditions as observed at Stations in Michigan.

PNEUMONIA.				Temperature, F.		Humidity of Air.§ Av. of 3 Daily Observations.		Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces.		Average Per Cent of Cloudiness.	Ozone, Relative Scale of 10°.		Av. Velocity of Wind, Miles per Hour by Anemometer.	Atmospheric Pressure, Inches Reduced to 32° F.		
	Months in Order of Greatest Per Cent of Weekly Reports Stating Presence of.	Per Cent of Weekly Reports Stating Presence of.	Av. Order of Prevalence where Present. † ‡	Av. Daily Range by Registering Thermometers.	Average of Three Daily Observations.	Relative Per Cent of Saturation.	Absolute.—Grains of Vapor in a Cubic Foot of Air.	Inhaled. ‖	Exhaled in excess of that Inhaled. ¶		Day Observation, 7 A. M. to 2 P. M.	Night Observation, 9 P. M. to 7 A. M.		Range. Monthly and for Year.	Range. Av. Daily by 3 Daily Observations. **	Average Pressure.
More than Av. Per Cent of Pneumonia.	Feb.	49	4.0	a15.76	27.33	84	1.84	1.15	10.53	70	4.18	4.86	12.1	1.209	.337	a 28.993
	Jan.	48	4.1	a12.90	26.90	87	1.77	1.11	10.57	79	4.20	a 4.03	a 8.6	1.420	.241	a 29.041
	April	46	4.2	19.57	47.11	a 74	3.19	1.99	9.69	a 50	4.02	4.83	9.9	a .677	a .192	a 29.025
	Mar.	45	4.2	a14.90	28.93	83	1.79	1.12	10.56	67	4.46	4.91	11.2	1.014	.259	29.063
	Dec.	38	3.9	a14.04	34.11	80	2.14	1.34	10.34	57	a 3.59	a 4.19	13.4	1.171	.277	a 29.028
	May	32	3.9	23.16	b55.40	a 66	b 3.67	2.29	9.39	a 40	4.40	4.41	a 9.7	a .489	a .130	29.118
Av.		27	4.0	18.01	47.61	77	3.54	2.21	9.57	55	3.99	4.22	9.9	.866	.202	29.057
Less than Av. Per Cent of Pneumonia.	Nov.	21	3.6	13.65	b34.57	a 84	b 2.32	1.45	10.23	a 80	3.45	3.51	a 11.7	a1.263	a .266	29.048
	Oct.	16	4.3	a18.18	49.01	75	b 3.37	2.11	9.57	52	3.85	3.92	a 10.1	.802	.200	a 29.105
	June	13	4.2	a21.02	67.62	73	5.86	3.66	8.02	48	a 4.10	a 4.37	7.4	.634	.120	29.015
	Aug.	8	5.1	a19.93	68.16	73	5.83	3.64	8.04	47	3.92	3.92	7.2	.581	.123	29.085
	July	7	3.7	a21.33	66.67	70	5.30	3.31	8.37	38	3.94	4.15	8 5	.543	.132	29.055
	Sept.	7	4.0	a21.70	65.50	75	5.42	3.39	8.29	33	3.82	3.61	8.5	.592	.148	a 29.158
MEMBRANOUS CROUP.																
More than Av. Per Ct. of Mem. Croup.	Mar.	10	4.9	a14.90	28.93	83	1.79	1.12	10.56	67	4.46	4.91	11.2	1.014	.259	29.063
	Jan.	9	4.8	a12.90	26.90	87	1.77	1.11	10.57	79	4.20	a 4.03	a 8.6	1.420	.241	a 29.041
	Feb.	8	4.7	a15.76	27.33	84	1.84	1.15	10.53	70	4.18	4.86	12.1	1.209	.337	a 28.993
	Dec.	6	5.3	a14.04	34.11	80	2.14	1.34	10.34	57	a 3.59	a 4.19	13.4	1.171	.277	a 29.028
	Nov.	5	4.5	a13.65	34.57	84	2.32	1.45	10.28	80	a 3.45	a 3.51	11.7	1.263	.266	a 29.048
Av.		4	4.4	18.01	47.61	77	3.54	2.21	9.57	55	3.99	4.22	9.9	.866	.202	29.057
Less than Av. Per Cent of Membranous Croup.	April	4	4.7	a19.57	b47.11	74	b 3.19	1.99	9.69	50	a 4.02	a 4.83	9.9	.677	.192	29.025
	May	2	5.6	a23.16	55.40	66	3.67	2.29	9.39	40	a 4.40	a 4.41	9.7	.489	.130	a 29.118
	July	1	2.7	a21.33	66.67	70	5.30	3.31	8.37	38	3.94	4.15	8.5	.543	.132	29.055
	Sept.	1	3.0	a21.70	65.50	75	5.42	3.39	8.29	33	3.82	3.61	8.5	.592	.148	a 29.158
	June	1	4.3	a21.02	67.62	73	5.86	3.66	8.02	48	a 4.10	a 4.37	7.4	.634	.120	29.015
	Oct.	1	6.3	a18.18	49.01	75	b 3.37	2.11	9.57	52	3.85	3.92	a 10.1	.802	.200	a 29.105
	Aug.	0	0	a19.93	68.16	73	5.83	3.64	8.04	47	3.92	3.92	7.2	.581	.123	29.085

*, †, ‡, §, ‖, ¶, **. For foot-notes with these marks, see Exhibit X, page 120.
a An exception to Proposition 1, relating to Pneumonia and Membranous Croup on page 118.
b An exception to Proposition 2, relating to Pneumonia and Membranous Croup on page 118.

DIAGRAM 2 —WEEKLY REPORTS OF SICKNESS IN MICHIGAN, IN 1891.

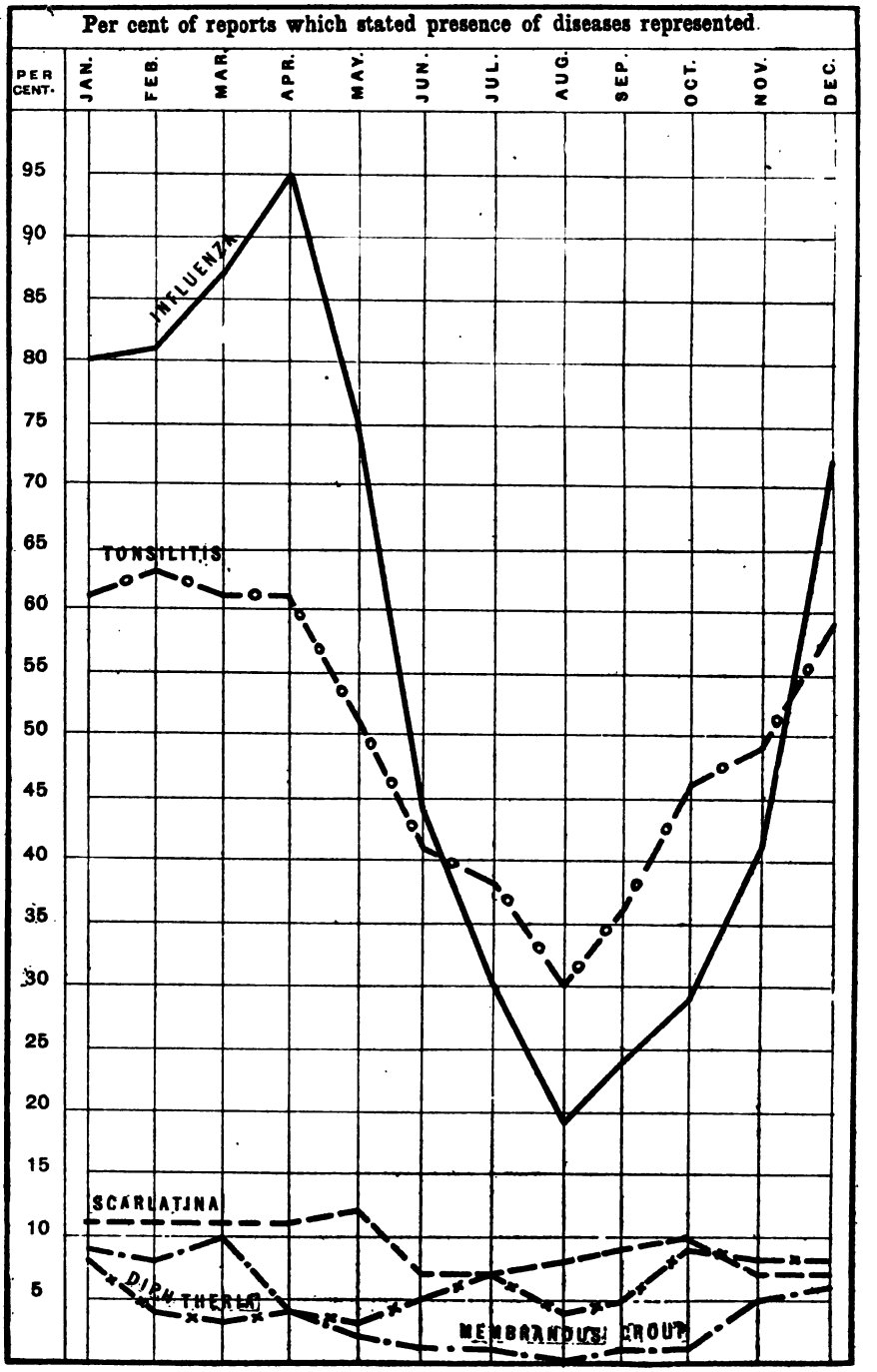


EXHIBIT XIII.—*By Year and Months for 1891 and for the preceding year, and an Average for the fourteen years, 1877-90,* also for the five years, 1886-1890. Stating on what Per Cent of the Weekly Reports received* PNEUMONIA, MEMBRANOUS CROUP, DIPHTHERIA, RHEUMATISM, INFLUENZA, SCARLET FEVER, TONSILLITIS,* AND NEURALGIA* *were Reported Present, and Comparing the Per Cents for Months in 1891, with the Averages for Corresponding Months in those years.*†

Years, etc.	Year.	Jan.	Feb.	March.	April.	May	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Pneumonia.													
Av. 14 years, 1877-1890	34	55	60	57	50	38	23	15	12	16	21	31	41
Av. 5 years, 1886-1890	28	45	50	49	41	32	18	12	10	14	18	26	33
1890	30	58	59	44	40	30	14	13	10	14	19	25	39
1891	27	48	49	45	46	32	13	7	8	7	16	21	38
In 1891 Greater than Av. 1877-1890	..	..	..	..	..	..	..	..	..	..	..	..	..
In 1891 Less than Av. 1877-90.	7	7	11	12	4	6	10	8	4	9	5	10	3
In 1891 Greater than Av. 1886-1890‡	..	3	..	..	5	=	..	..	..	..	..	..	5
In 1891 Less than Av. 1886-90‡	1	..	1	4	..	=	5	5	2	7	2	5	..

Membranous Croup.	Year.	Jan.	Feb.	March.	April.	May	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 14 years, 1877-1890	6	10	8	7	6	5	3	2	2	3	5	8	9
Av. 5 years, 1886-1890	4	7	5	4	5	4	3	1.3	1.8	2	5	6	6
1890	4	4	3	4	5	4	3	2	2	2	5	6	9
1891	4	9	8	10	4	2	1	1	0	1	1	5	6
In 1891 Greater than Av. 1877-1890	..	..	..	=	3	..	..	..	..	..	..	..	..
In 1891 Less than Av. 1877-90.	2	1	=	..	2	3	2	1	2	2	4	3	3
In 1891 Greater than Av. 1886-1890‡	..	..	..	..	..	..	..	..	..	..	..	..	..
In 1891 Less than Av. 1886-90‡	=	2	3	6	..	..	..	..	..	..	..	..	=

Diphtheria.													
Av. 14 years, 1877-1890	18	28	20	17	16	14	12	12	13	14	22	24	23
Av. 5 years, 1886-1890	9	12	9	8	7	8	6	6	6	8	12	12	10
1890	8	9	9	6	5	8	5	6	6	7	9	11	10
1891	6	8	4	3	4	3	5	7	4	5	9	8	8
In 1891 Greater than Av. 1877-1890	..	..	..	..	..	..	..	..	..	..	..	..	..
In 1891 Less than Av. 1877-90.	12	15	16	14	12	11	7	5	9	9	13	16	15
In 1891 Greater than Av. 1886-1890‡	..	..	..	..	..	..	1	..	..	..	..	..	..
In 1891 Less than Av. 1886-90‡	3	4	5	5	3	5	1	..	2	3	3	4	2

Rheumatism.	Year.	Jan.	Feb.	March.	April.	May	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 14 years, 1877-1890	68	72	72	74	75	72	68	62	58	62	67	71	73
Av. 5 years, 1886-1890	68	70	70	73	75	73	70	62	59	65	68	69	71
1890	71	78	69	72	79	78	70	68	62	71	68	74	75
1891	69	77	75	76	80	76	69	64	60	60	67	65	67
In 1891 Greater than Av. 1877-1890	1	5	3	2	5	4	1	2	2	..	=	..	..
In 1891 Less than Av. 1877-90.	..	..	..	..	..	..	..	..	..	2	=	6	6
In 1891 Greater than Av. 1886-1890‡	1	7	5	3	5	3	..	2	1	..	..	..	..
In 1891 Less than Av. 1886-90‡	..	..	..	..	..	..	1	..	..	5	1	4	4

Influenza.													
Av. 14 years, 1877-1890	39	56	61	58	50	38	27	19	20	28	33	40	48
Av. 5 years, 1886-1890	37	54	60	57	48	36	25	16	16	26	33	38	45
1890	53	92	95	78	53	44	30	24	25	41	49	56	69
1891	55	80	81	87	95	75	44	30	19	24	29	41	72
In 1891 Greater than Av. 1877-1890	16	24	20	29	45	37	17	11	..	..	..	1	24
In 1891 Less than Av. 1877-90.	..	..	..	..	..	..	..	..	1	4	4	..	..
In 1891 Greater than Av. 1886-1890‡	18	26	21	30	47	39	14	14	3	..	..	3	27
In 1891 Less than Av. 1886-90‡	..	..	..	..	..	..	..	..	..	2	4	..	..

Scarlet Fever.	Year.	Jan.	Feb.	March.	April.	May	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 14 years, 1877-1890	15	20	20	20	19	17	14	11	10	11	15	16	16
Av. 5 years, 1886-1890	10	13	11	11	11	10	9	6	5	6	11	11	12
1890	10	8	8	9	8	8	9	7	8	7	14	16	12
1891	9	11	11	11	11	12	7	7	8	9	10	7	7
In 1891 Greater than Av. 1877-1890	..	..	..	..	..	..	..	..	..	..	..	..	..
In 1891 Less than Av. 1877-90.	6	9	9	9	8	5	7	4	2	2	5	9	9
In 1891 Greater than Av. 1886-1890‡	..	..	=	=	=	2	..	1	3	3	..	..	..
In 1891 Less than Av. 1886-90‡	1	2	=	=	=	..	2	..	..	..	1	4	5

Neuralgia.													
Av. 12 years, 1879-1890	66	68	70	72	72	67	64	60	58	60	63	67	69
Av. 5 years, 1886-1890	65	68	69	71	71	67	63	61	59	60	63	66	68
1890	67	68	72	73	75	70	65	61	61	64	65	66	71
1891	66	73	75	73	72	67	67	61	55	58	60	66	66
In 1891 Greater than Av. 1879-90	=	5	5	1	=	=	3	1	..	..	..	..	..
In 1891 Less than Av. 1879-90.	=	..	..	..	=	=	..	..	3	2	3	1	3
In 1891 Greater than Av. 1886-90‡	1	5	6	2	1	=	4	=	..	..	..	=	..
In 1891 Less than Av. 1886-90‡	..	..	..	..	..	=	..	=	4	2	3	=	2

Tonsillitis.	Year.	Jan.	Feb.	March.	April.	May	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 12 years, 1879-1890	48	59	60	59	54	47	40	32	32	37	45	55	59
Av. 5 years, 1886-1890	47	57	57	59	52	46	38	31	31	36	45	54	57
1890	50	57	56	55	53	55	41	38	37	41	51	55	61
1891	49	61	63	61	61	51	41	38	30	36	46	49	59
In 1891 Greater than Av. 1879-90	1	2	3	2	8	4	1	6	..	..	1	..	=
In 1891 Less than Av. 1879-90.	..	..	..	..	..	..	..	..	2	1	..	6	=
In 1891 Greater than Av. 1886-90‡	2	4	6	2	9	5	3	7	..	=	1	..	2
In 1891 Less than Av. 1886-90‡	..	..	..	..	..	..	..	..	1	=	..	5	..

* The average line for tonsillitis and neuralgia includes only the twelve years, 1879-1890.

† Other statements for 1891, and months in 1891, relative to these diseases are given in Table 2, pages 98-107, and in Exhibits XII., XIV., XV., and XVI., pages 121, 125, 126, and 127, where are also given for convenient comparison statements of coincident meteorological conditions.

‡ This comparison is made because of change of plan of reports in May, 1885, as explained on pages 80-1.

The lines for 1891 in Exhibit XIII. are graphically represented in Diagrams 1, page 87, 2, page 122, 3 page 124, and 4 on page 130. Comments on Influenza, Diagram 2, and Exhibit XIII, are on pages 111–112.

DIAGRAM 3 —WEEKLY REPORTS OF SICKNESS IN MICHIGAN, IN 1891.

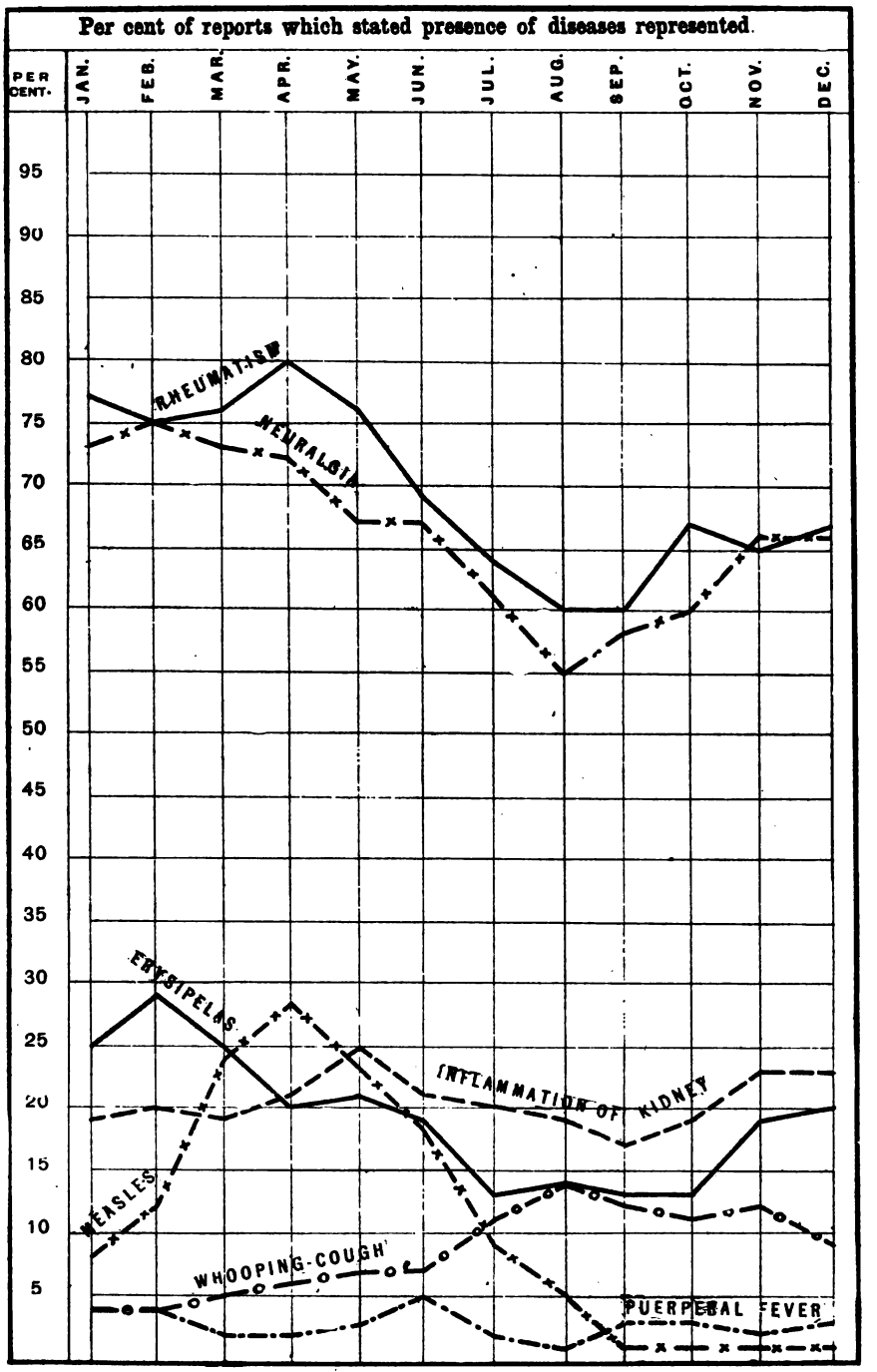


EXHIBIT XIV.—DIPHTHERIA AND TONSILLITIS.—*Stating for the Year and for each Month of the Year 1891, what Per Cent of the Weekly Reports of Sickness Stated Presence of Diphtheria and Tonsillitis, and what were the Meteorological Conditions as observed at Stations in Michigan.**

DIPHTHERIA.				Temperature, F.		Humidity of Air. § Av. of 3 Daily Observations.		Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces.		Average Per Cent of Cloudiness.	Ozone, Relative Scale of 10°.		Av. Velocity of Wind, Miles per Hour by Anemometer.	Atmospheric Pressure, Inches Reduced to 32° F.		
Months in Order of Greatest Per Cent of Weekly Reports Stating Presence of.	Per Cent of Weekly Reports Stating Presence of.	Av. Order of Prevalence where Present. † ‡	Av. Daily Range by Registering Thermometers.	Average of Three Daily Observations.	Relative Per Cent of Saturation.	Absolute.—Grains of Vapor in a Cubic Foot of Air.	Inhaled. ‖	Exhaled in excess of that Inhaled. ¶		Day Observation, 7 A. M. to 2 P. M.	Night Observation, 9 P. M. to 7 A. M.		Range. Monthly and for Year.	Range. Av. Daily by 3 Daily Observations. **	Average Pressure.
More than Av. Per Cent of Diphtheria.																
Oct.	9	4.8	18.18	b49.01	a 75	3.37	2.11	9.57	a 52	a 3.85	a 3.92	10.1	a .802	a .200	29.105
Nov.	8	3.4	a13.65	34.57	84	2.32	1.45	10.23	80	a 3.45	a 3.51	11.7	1.263	.266	a 29.048
Dec.	8	4.0	a14.04	34.11	80	2.14	1.34	10.34	57	a 3.59	a 4.19	13.4	1.171	.277	a 29.028
Jan.	8	4.5	a12.90	26.90	87	1.77	1.11	10.57	79	4.20	a 4.03	a 8.6	1.420	.241	a 29.041
July	7	4.7	21.33	b66.67	a 70	b 5.30	3.31	8.37	a 38	a 3.94	a 4.15	a 8.5	a .543	a .182	a 29.055
Av.	6	4.4	18.01	47.61	77	3.54	2.21	9.57	55	3.99	4.22	9.9	.866	.202	29.057
Less than Av. Per Cent of Diphtheria.																
June	5	3.3	a21.02	67.62	73	5.86	3.66	8.02	48	a 4.10	a 4.37	7.4	.634	.120	29.015
Sept.	5	4.5	a21.70	65.50	75	5.42	3.39	8.29	33	3.82	3.61	8.5	.592	.148	a 29.158
Feb.	4	5.1	15.76	b27.33	a 84	b 1.84	1.15	10.53	a 70	a 4.18	a 4.86	a 12.1	a1.209	a .337	28.998
April	4	5.1	a19.57	b47.11	74	b 3.19	1.99	9.69	50	a 4.02	a 4.83	9.9	.677	.192	29.025
Aug.	4	5.8	a19.93	68.15	73	5.83	3.64	8.04	47	3.92	3.92	7.2	.581	.123	29.035
May	3	4.1	a23.16	55.40	66	3.67	2.29	9.39	40	a 4.40	a 4.41	9.7	.489	.130	a 29.118
March	3	4.3	14.90	b28.93	a 83	b 1.79	1.12	10.56	a 67	a 4.46	a 4.91	a 11.2	a1.014	a .259	a 29.063
TONSILLITIS.																
More than Av. Per Cent of Tonsillitis.																
Feb.	63	3.4	a15.76	27.33	84	1.84	1.15	10.53	70	4.18	4.86	12.1	1.209	.337	a 28.993
Jan.	61	3.5	a12.90	26.90	87	1.77	1.11	10.57	79	4.20	a 4.03	a 8.6	1.420	.241	a 29.041
March	61	3.7	a14.90	28.93	83	1.79	1.12	10.56	67	4.46	4.91	11.2	1.014	.259	29.063
April	61	3.7	19.57	47.11	a 74	3.19	1.99	9.69	a 50	4.02	4.83	9.9	a .677	a .192	a 29.025
Dec.	59	3.2	a14.04	34.11	80	2.14	1.34	10.34	57	a 3.59	a 4.19	13.4	1.171	.277	a 29.028
May	51	3.3	23.16	b55.40	a 66	b 3.67	2.29	9.39	a 40	4.40	4.41	a 9.7	a .489	a .130	29.118
Nov.	49	2.8	a13.65	34.57	84	2.32	1.45	10.23	80	a 3.45	a 3.51	11.7	1.263	.266	a 29.048
Av.	49	3.3	18.01	47.61	77	3.54	2.21	9.57	55	3.99	4.22	9.9	.866	.202	29.057
Less than Av. Per Cent of Tonsillitis.																
Oct.	46	3.1	a18.18	49.01	75	b 3.37	2.11	9.57	52	3.85	3.92	a 10.1	.802	.200	a 29.105
June	41	3.0	a21.02	67.62	73	5.86	3.66	8.02	48	a 4.10	a 4.37	7.4	.634	.120	29.015
July	38	2.9	a21.33	66.67	70	5.30	3.31	8.37	38	3.94	4.15	8.5	.543	.132	29.055
Sept.	36	3.2	a21.70	65.50	75	5.42	3.39	8.29	33	3.82	3.61	8.5	.592	.148	a 29.158
Aug.	30	3.5	a19.93	68.16	73	5.83	3.64	8.04	47	3.92	3.92	7.2	.581	.123	29.035

*, †, ‡, §, ‖, ¶, **. For foot-notes with these marks, see Exhibit X, page 120.
a An exception to Proposition 1, relating to Diphtheria and Tonsillitis, on page 118.
b An exception to Proposition 2, relating to Diphtheria and Tonsillitis, on page 118.

EXHIBIT XV.—INFLUENZA AND SCARLET FEVER.—*Stating for the Year and for each Month of the Year 1891, what Per Cent of the Weekly Reports of Sickness Stated Presence of Influenza and Scarlet Fever, and what were the Meteorological Conditions as observed at Stations in Michigan.**

Influenza.				Temperature, F.		Humidity of Air.§ Av. of 8 Daily Observations.		Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces.		Ozone, Relative Scale of 10°.			Atmospheric Pressure, Inches Reduced to 32° F.		
Months in Order of Greatest Per Cent of Weekly Reports Stating Presence of.	Per Cent of Weekly Reports Stating Presence of.	Av. Order of Prevalence where Present.††	Av. Daily Range by Registering Thermometers.	Average of Three Daily Observations.	Relative Per Cent of Saturation.	Absolute.—Grains of Vapor in a Cubic Foot of Air.	Inhaled.	Exhaled in excess of that Inhaled.¶	Average Per Cent of Cloudiness.	Day Observation, 7 A. M. to 2 P. M.	Night Observation, 9 P. M. to 7 A. M.	Av. Velocity of Wind, Miles per Hour by Anemometer.	Range. Monthly and for Year.	Range. Av. Daily by 3 Daily Observations.**	Average Pressure.
More than Av. Per Cent of Influenza.															
April	95	1.3	19.57	47.11	a 74	3.19	1.99	9.69	a 50	4.02	4.83	9.9	a .677	a .192	a 29.025
Mar.	87	1.4	a14.90	28.93	83	1.79	1.12	10.56	67	4.46	4.91	11.2	1.014	.259	29.063
Feb.	81	1.5	a15.76	27.33	84	1.84	1.15	10.53	70	4.18	4.86	12.1	1.209	.337	a 28.993
Jan.	80	1.7	a12.90	26.90	87	1.77	1.11	10.57	79	4.20	a 4.03	a 8.6	1.420	.241	a 29.041
May	75	1.8	23.16	b55.40	a 66	b 3.67	2.29	9.39	a 40	4.40	4.41	a 9.7	a .489	a .130	29.118
Dec.	72	1.6	a14.04	34.11	80	2.14	1.34	10.34	57	a 3.59	a 4.19	13.4	1.171	.277	a 29.028
Av.	55	2.0	18.01	47.61	77	3.54	2.21	9.57	55	3.99	4.22	9.9	.866	.202	29.057
Less than Av. Per Cent of Influenza.															
June	44	2.2	a21.02	67.62	73	5.86	3.66	8.02	48	a 4.10	a 4.37	7.4	.634	.120	29.015
Nov.	41	2.2	13.65	b34.57	a 84	b 2.32	1.45	10.23	a 80	3.45	3.51	a 11.7	a1.263	a .266	29.048
July.	30	3.0	a21.33	66.67	70	5.30	3.31	8.37	38	3.94	a 4.15	8.5	.543	.132	29.055
Oct.	29	2.9	a18.18	49.01	75	b 3.37	2.11	9.57	52	3.85	3.92	a 10.1	.802	.200	a 29.105
Sept.	24	3.2	a21.70	65.50	75	5.42	3.39	8.29	33	3.82	3.61	8.5	.592	.148	a 29.158
Aug.	19	3.3	a19.93	68.16	73	5.33	3.64	8.04	47	3.92	3.92	7.2	.581	.123	29.035
Scarlet Fever.															
More than Av. Per Cent of Scarlet Fever.															
May	12	3.8	23.16	b55.40	a 66	b 3.67	2.29	9.39	a 40	4.40	4.41	a 9.7	a .489	a .130	29.118
Feb.	11	4.3	a15.76	27.33	84	1.84	1.15	10.53	70	4.18	4.86	12.1	1.209	.337	a 28.993
Jan.	11	4.5	a12.90	26.90	87	1.77	1.11	10.57	79	4.20	a 4.03	a 8.6	1.420	.241	a 29.041
April	11	5.2	19.57	47.11	74	3.19	1.99	9.69	a 50	4.02	4.83	9.9	a .677	a .192	a 29.025
Mar.	11	5.4	a14.90	28.93	83	1.79	1.12	10.56	67	4.46	4.91	11.2	1.014	.259	29.063
Oct.	10	3.7	18.18	b49.01	a 75	3.37	2.11	9.57	a 52	a 3.85	a 3.92	10.1	a .802	a .200	29.105
Sept.	9	3.8	21.70	b65.50	a 75	b 5.42	3.39	8.29	a 33	a 3.82	a 3.61	a 8.5	a .592	a .148	29.158
Av.	9	4.2	18.01	47.61	77	3.54	2.21	9.57	55	3.99	4.22	9.9	.866	.202	29.057
Less than Av. Per Cent of Scarlet Fever.															
Aug.	8	4.3	a19.93	68.16	73	5.33	3.64	8.04	47	3.92	3.92	7.2	.581	.123	29.035
June	7	2.8	a21.02	67.62	73	5.86	3.66	8.02	48	a 4.10	a 4.37	7.4	.634	.120	29.015
Dec.	7	3.8	14.04	b34.11	a 80	b 2.14	1.34	10.34	a 57	3.59	4.19	a 13.4	a1.171	a .277	29.028
Nov.	7	4.1	13.65	b34.57	a 84	b 2.32	1.45	10.23	a 80	3.45	3.51	a 11.7	a1.263	a .266	29.048
July.	7	4.3	a21.33	66.67	70	5.30	3.31	8.37	38	3.94	4.15	8.5	.543	.132	29.055

*, †, ‡, §, ‖, ¶, **. For foot-notes with these marks, see Exhibit X, on page 120.
a An exception to Proposition 1, relating to Influenza and Scarlet Fever, on page 118.
b An exception to Proposition 2, relating to Influenza and Scarlet Fever, on page 118.

EXHIBIT XVI.—RHEUMATISM AND NEURALGIA.—*Stating for the Year and for each Month of the Year 1891, what Per Cent of the Weekly Reports of Sickness Stated Presence of Rheumatism and Neuralgia and what were the Meteorological Conditions as observed at Stations in Michigan.

	Months in Order of Greatest Per Cent of Weekly Reports Stating Presence of.	Rheumatism. Per Cent of Weekly Reports stating Presence of.	Rheumatism. Av. Order by Prevalence where Present. ††	Temperature, F. Av. Daily Range by Registering Thermometers.	Temperature, F. Average of Three Daily Observations.	Humidity of Air § Av. of 3 Daily Observations. Relative Per Cent of Saturation.	Humidity of Air § Av. of 3 Daily Observations. Absolute, — Grains of Vapor in a Cubic Foot of Air.	Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces. Inhaled.	Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces. Exhaled in excess of that Inhaled. ¶	Average Per Cent of Cloudiness.	Ozone, Relative Scale of 10°. Day Observation, 7 A. M. to 2 P. M.	Ozone, Relative Scale of 10°. Night Observation, 9 P. M. to 7 A. M.	Av. Velocity of Wind, Miles per Hour by Anemometer.	Atmospheric Pressure, Inches Reduced to 32° F. Range. Monthly and for Year.	Atmospheric Pressure, Inches Reduced to 32° F. Range. Av. Daily by 3 Daily Observations. **	Atmospheric Pressure, Inches Reduced to 32° F. Average Pressure.
More than Av. Per Cent of Rheumatism.	April	80	3.3	19.57	47.11	a 74	3.19	1.99	9.69	a 50	4.02	4.83	9.9	a .677	a .192	a 29.025
	Jan.	77	3.0	a12.90	26.90	87	1.77	1.11	10.57	79	4.20	a 4.03	a 8.6	1.420	.241	a 29.041
	May	76	2.8	23.16	b55.40	a 66	b 3.67	2.29	9.39	a 40	4.40	4.41	a 9.7	a .489	a .130	29.118
	Mar.	76	3.2	a14.90	28.93	83	1.79	1.12	10.56	67	4 46	4.91	11.2	1.014	.259	29.063
	Feb.	75	3.1	a15.76	27.33	84	1.84	1.15	10.53	70	4.18	4.86	12.1	1.209	.337	a 28.993
	June	69	2.4	21.02	b67.62	a 73	b 5.86	3.66	8.02	a 48	4.10	4.37	a 7.4	a .634	a .120	a 29.015
Av.		69	2.9	18.01	47.61	77	3.54	2.21	9.57	55	3.99	4.22	9.9	.866	.202	29.057
Less than Av. Per Ct. of Rheumatism.	Oct.	67	2.7	a18.18	49.01	75	b 3.37	2.11	9.57	52	3.85	3.92	a 10.1	.802	.200	a 29.105
	Dec.	67	3.0	14.04	b34.11	a 80	a 2.14	1.34	10.34	a 57	3.59	4.19	a 13.4	a1.171	a .277	29.028
	Nov.	65	2.5	13.65	b34.57	a 84	b 2.32	1.45	10.23	a 80	3.45	3.51	a 11.7	a1.263	a .266	29.048
	July	64	2.8	a21.33	66.67	70	5.30	3.31	8.37	38	3.94	4.15	8.5	.543	.132	29.055
	Sept.	60	3.0	a21.70	65.50	75	5.42	3.39	8.29	33	3.82	3.61	8.5	.592	.148	a 29.158
	Aug.	60	3.2	a19.93	68.16	73	5.83	3.64	8.04	47	3.92	3.92	7.2	.581	.123	29.035
	Neuralgia.															
More than Av. Per Cent of Neuralgia.	Feb.	75	3.0	a15.76	27.33	84	1.84	1.15	10.53	70	4.18	4.86	12.1	1.209	.337	a 28.993
	Jan.	73	3.0	a12.90	26.90	87	1.77	1.11	10.57	79	4.20	a 4.03	a 8.6	1.420	.241	a 29.041
	Mar.	73	3.1	a14.90	28.93	83	1.79	1.12	10.56	67	4.46	4.91	11.2	1.014	.259	29.063
	Apr.	72	3.3	19.57	47.11	a 74	3.19	1.99	9.69	a 50	4.02	4.83	9.9	a .677	a .192	a 29.025
	June	67	2.4	21.02	b67.62	a 73	b 5.86	3.66	8.02	a 48	4.10	4.37	a 7.4	a .634	a .120	a 29.015
	May	67	2.8	23.16	b55.40	a 66	b 3.67	2.29	9.39	a 40	4.40	4.41	a 9.7	a .489	a .130	29.118
	Nov.	66	2.3	a13.65	34.57	84	2.32	1.45	10.23	80	a 3.45	a 3.51	11.7	1.263	.266	a 29.048
	Dec.	66	2.7	a14.04	34.11	80	2.14	1.34	10.34	57	a 3.59	a 4.19	13.4	1.171	.277	a 29.028
Av.		66	2.8	18.01	47.61	77	3.54	2.21	9.57	55	3.99	4.22	9.9	.866	.202	29.057
Less than Av. Per Cent of Neuralgia.	July	61	2.5	a21.33	66.67	70	5.30	3.31	8.37	38	3.94	4.15	8.5	.543	.132	29.055
	Oct.	60	2.5	a18.18	49.01	75	b 3.37	2.11	9.57	52	3.85	3.92	a 10.1	.802	.200	a 29.105
	Sept.	58	2.8	a21.70	65.50	75	5.42	3.39	8.29	33	3.82	3.61	8.5	.592	.148	a 29.158
	Aug.	55	2.9	a19.93	68.16	73	5.83	3.64	8.04	47	3.92	3.92	7.2	.581	.123	29.035

*, †, ‡, §, ‖, ¶, **. For foot-notes with these marks, see Exhibit X., page 120.
a An exception to proposition 1, relating to Rheumatism and Neuralgia on page 118.
b An exception to proposition 2, relating to Rheumatism and Neuralgia on page 118.

EXHIBIT XVII.—PULMONARY CONSUMPTION AND PLEURITIS.—*Stating for the Year and for each Month of the Year 1891, what Per Cent of the Weekly Reports of Sickness Stated Presence of Pulmonary Consumption and Pleuritis, and what were the Meteorological Conditions as observed at Stations in Michigan.**

	Months in Order of Greatest Per Cent of Weekly Reports Stating Presence of.	Per Cent of Weekly Reports Stating Presence of.	Av. Order of Prevalence where present. †‡	Temperature, F. Av. Daily Range by Registering Thermometers.	Temperature, F. Average of Three Daily Observations.	Humidity of Air. Av. of 3 Daily Observations. Relative Per Cent of saturation.	Humidity of Air. Av. of 3 Daily Observations. Absolute,—Grains of Vapor in a Cubic Foot of Air.	Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces. Inhaled.‖	Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces. Exhaled in excess of that Inhaled.¶	Average Per Cent of Cloudiness.	Ozone, Relative Scale of 10°. Day Observation, 7 A. M. to 2 P. M.	Ozone, Relative Scale of 10°. Night Observation, 9 P. M. to 7 A. M.	Av. Velocity of Wind, Miles per Hour by Anemometer.	Atmospheric Pressure, Inches Reduced to 32° F. Range. Monthly and for year.	Atmospheric Pressure, Inches Reduced to 32° F. Range. Av. Daily by 3 Daily Observations.**	Atmospheric Pressure, Inches Reduced to 32° F. Average Pressure.
CONSUMPTION.																
More than Av. Per Ct. of Consumption.	April	59	4.1	19.57	47.11	a 74	3.19	1.99	9.69	a 50	4.02	4.83	9.9	a .677	a .192	a 29.025
	Jan.	58	3.9	a12.90	26.90	87	1.77	1.11	10.57	79	4.20	a 4.03	a 8.6	1.420	.241	a 29.041
	May	55	3.7	23.16	b55.40	a 66	b 3.67	2.29	9.39	a 40	4.40	4.41	a 9.7	a .489	a .130	29.118
	March	54	4.0	a14.90	28.93	83	1.79	1.12	10.56	67	4.46	4.91	11.2	1.014	.259	29.063
	Feb.	51	3.7	a15.76	27.33	84	1.84	1.15	10.53	70	4.18	4.86	12.1	1.209	.337	a 28.993
Av.		49	3.8	18.01	47.61	77	3.54	2.21	9.57	55	3.99	4.22	9.9	.866	.202	*29.057
Less than Av. Per Cent of Consumption.	June	46	3.4	a21.02	67.62	73	5.86	3.66	8.02	48	a 4.10	a 4.37	7.4	.634	.120	29.015
	Nov.	46	3.8	13.65	b34.57	a 84	b 2.32	1.45	10.23	a 80	3.45	3.51	a 11.7	a1.268	a .266	29.048
	July	45	3.5	a21.33	66.67	70	5.30	3.31	8.37	38	3.94	4.15	8.5	.543	.132	29.055
	Dec.	45	4.3	14.04	b34.11	a 80	b 2.14	1.34	10.34	a 57	3.59	4.19	a 13.4	a1.171	a .277	29.028
	Oct.	44	4.0	a18.18	49.01	75	b 3.37	2.11	9.57	52	3.85	3.92	a 10.1	.802	.200	a 29.105
	Aug.	43	3.7	a19.93	68.16	73	5.83	3.64	8.04	47	3.92	3.92	7.2	.581	.123	29.035
	Sept.	43	3.7	a21.70	65.50	75	5.42	3 39	8.29	33	3.82	3.61	8.5	.592	.148	a 29.158
PLEURITIS.																
More than Av. Per Cent of Pleuritis.	Jan.	31	4.2	a12.90	26.90	87	1.77	1.11	10.57	79	4.20	a 4.03	a 8.6	1.420	.241	a 29.041
	April	31	4.4	19.57	47.11	a 74	3.19	1.99	9.69	a 50	4.02	4.83	9.9	a .677	a .192	a 29.025
	Feb.	28	4.3	a15.76	27.33	84	1.84	1.15	10.53	70	4.18	4.86	12.1	1.209	.337	a 28.993
	Mar.	28	4.6	a14.90	28.93	83	1.79	1.12	10.56	67	4.46	4.91	11.2	1.014	.259	29.063
	May	24	3.8	23.16	b55.40	a 66	b 3.67	2.29	9.39	a 40	4.40	4.41	a 9.7	a .489	a .130	29.118
	Nov.	22	3.5	a13.65	34.57	84	2.32	1.45	10.23	80	a 3.45	a 3.51	11.7	1.263	.266	a 29.048
	Dec.	21	4.1	a14.04	34.11	80	2.14	1.34	10.34	57	a 3.59	a 4.19	13.4	1.171	.277	a 29.028
Av.		21	4.1	18.01	47.61	77	3.54	2.21	9.57	55	3.99	4.22	9.9	.866	.202	29.057
Less than Av. Per Cent of Pleuritis.	Oct.	19	3.7	a18.18	49.01	75	b 3.37	2.11	9.57	52	3.85	3.92	a 10.1	.802	.200	a 29.105
	June	18	3.7	a21.02	67.62	73	5.86	3.66	8.02	48	a 4.10	a 4.37	7.4	.634	.120	29.015
	Sept.	12	4.0	a21.70	65.50	75	5.42	3.39	8.29	33	3.82	3.61	8.5	.592	.148	a 29.158
	July	10	3.8	a21.33	66.67	70	5.30	3.31	8.37	38	3.94	4.15	8.5	.543	.132	29.055
	Aug.	6	4.7	a19.93	68.16	73	5.83	3.64	8.04	47	3.92	3.92	7.2	.581	.123	29.035

*, †, ‡, §, ‖, ¶, **. For foot-notes with these marks see Exhibit X., page 120.
a An exception to Proposition 1, relating to Consumption and Pleuritis on page 118.
b An exception to Proposition 2, relating to Consumption and Pleuritis on page 118.

EXHIBIT XVIII.—SICKNESS FROM CONSUMPTION.—1878-91.—*By Year and Months for each of the Fourteen Years, 1878-91, and an Average for the thirteen years, 1878-90, also for the five years, 1886-90; Stating on what Per Cent of the Weekly Reports received* CONSUMPTION *was reported Present, and Comparing the Per Cents for 1891 with the Averages for corresponding Months in those Years.*

Years, etc.	Annual Av.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Average 13 years, 1878-90*	60	61	63	64	65	62	61	58	57	58	59	59	59
Average 5 years, 1886-90	51	53	53	56	56	54	52	48	49	48	49	49	52
1877*	52	50	47	47	53	49	50	43	35	38	34	68	65
1878	71	67	72	76	75	72	68	68	65	70	73	73	71
1879	70	71	71	69	77	74	73	69	67	67	69	67	64
1880	68	65	69	70	72	70	69	66	62	66	66	68	70
1881	71	74	76	73	76	69	68	67	67	70	73	74	67
1882	66	66	68	66	66	69	66	67	63	63	65	62	65
1883	61	69	66	66	65	62	61	59	55	57	58	58	60
1884	63	56	61	66	70	67	65	63	63	63	65	61	58
1885	58	60	63	71	69	58	61	56	52	54	55	56	56
1886	55	61	58	60	61	60	55	51	52	48	51	55	54
1887	51	53	54	61	61	54	48	48	47	45	48	47	50
1888	49	50	51	52	47	53	56	51	49	44	43	44	48
1889	48	49	49	50	50	46	47	47	46	50	52	49	51
1890	52	50	53	55	61	57	52	45	50	51	51	49	55
1891 (see Diagram on opposite page)	49	58	51	54	59	55	46	45	43	43	44	46	45
In 1891 Greater than Av. 1878-90	....	....	....	....	....	....	....	....	....	....	....	....	....
In 1891 Less than Av. 1878-90	11	3	12	10	6	7	15	13	14	15	15	13	14
In 1891 Greater than Av. 1886-90†	....	5	....	....	3	1	....	....	....	....	....	....	....
In 1891 Less than Av. 1886-90†	2	....	2	2	....	....	6	3	6	5	5	3	7

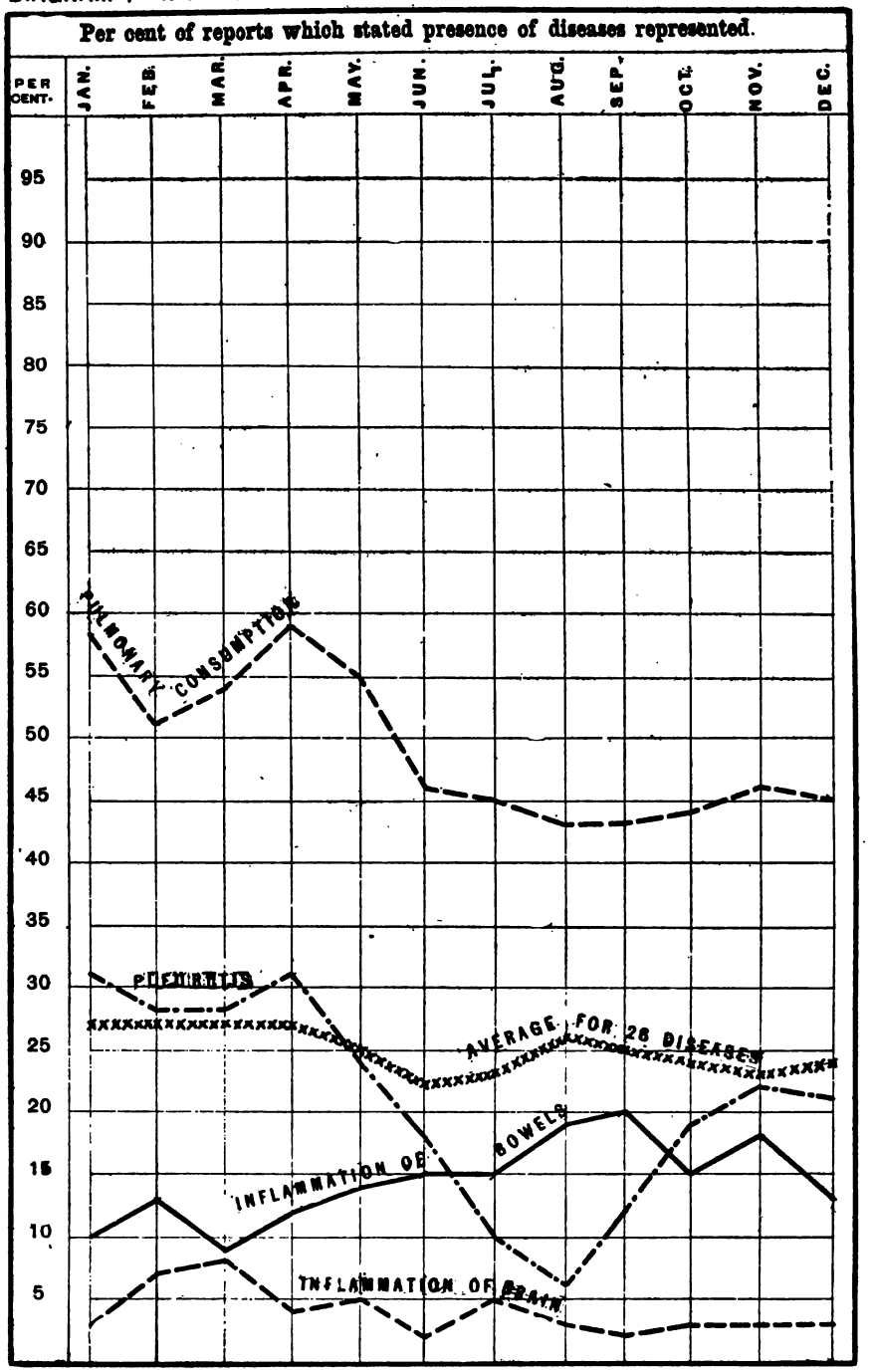
* As consumption was not printed on the first blanks, nor on all used in 1877, that year is excluded from the average line.

† This comparison is made because of change of plan of reports in May, 1885, as explained on pages 80-1.

RELATIONS OF DIARRHEA TO METEOROLOGICAL CONDITIONS.

PROPOSITION 1.—That in months when **more** than the average per cent of weekly reports stated the presence of diarrhea, the average daily range of temperature, the average daily temperature, the absolute humidity of the atmosphere, the monthly and the average daily range of the barometer, and the average daily pressure of the atmosphere were **greater** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of diarrhea, these conditions were **less** than the average for the year. In Exhibit XIX., page 133, the letter *a* marks exceptions to this proposition for the year 1891.

DIAGRAM 4.—WEEKLY REPORTS OF SICKNESS IN MICHIGAN, IN 1891.



PROPOSITION 2.—That in months when **more** than the average per cent of weekly reports stated the presence of diarrhea, the relative humidity of the atmosphere, the average per cent of cloudiness, the ozone, and the average velocity of the wind were **less** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of diarrhea, these conditions were **greater** than the average for the year. In Exhibit XIX., page 133, the letter *b* marks exceptions to this proposition for 1891.

Explanations of propositions 1 and 2 are given below, and a summary of the evidence in Exhibit XIX., is given in Exhibit XXV., on a following page.

PROPOSITION 3.—For those months which are not, as regards the absolute humidity of the atmosphere, exceptions to Proposition 1, it is true also that the quantity of vapor inhaled daily was **greater** than the average, and the quantity exhaled daily in excess of that inhaled was **less** than the average in months when **more** than the average per cent of reports stated presence of diarrhea; and that **less** vapor was inhaled and a **greater** excess exhaled daily in months when the per cent of reports stating presence of diarrhea, was **less** than the average.

Proposition 3 is true also in relation to cholera infantum, intermittent fever, remittent fever, typhoid fever, typho-malarial fever, measles, whooping cough, cholera morbus and dysentery, treated in Exhibits XIX., XXI., XXII., XXIII. and XXIV, page 133, and following pages.

On what per cent of the weekly reports received, by months in the fourteen years, 1877–1890, the eight foregoing diseases were reported present, is stated in Exhibit XX., page 134. In Diagram 1, page 87, is graphically represented by month what per cent of the reports in each month in 1891, stated the presence of diarrhea.

The greatest sickness reported from diarrhea in 1891, was in the months of August, September, July and Obtober.

As shown by Exhibit XX., the reports indicate an increased prevalence of diarrhea in the year 1891. Compared with the year 1890, there was a slightly decreased prevalence of diarrhea in February, June and July, and in every other month except in March there was a marked increase. In March it was the same.

Compared with the corresponding months in the average for the fourteen years, 1877–1890, the per cent of reports of diarrhea was slightly less in February, April, June and July, 1891. In December the per cent was the same, and for every other month of the year slightly more.

The average temperature for the year 1891 was slightly higher than the average for 1877–1890. It was also higher for each month of the year, except in March, May, July, October and November, than the average for corresponding months in the fourteen years, 1877–90. The absolute humidity was slightly more for the year and for each month of the year, except May, July, October and November, than the average for 1877–1890. The relative humidity was slightly more for the year 1891, and for each month of the year, except in May, July, October and December, than the average for the thirteen years, 1878–1890.

RELATIONS OF CHOLERA INFANTUM AND OTHER "WARM WEATHER" DISEASES TO METEOROLOGICAL CONDITIONS.

PROPOSITION 1.—That in months when **more** than the average per cent of weekly reports stated the presence of cholera infantum (or of intermittent fever, remittent fever, typhoid fever, typho-malarial fever, measles, or whooping-cough), the average daily range of temperature, the average daily temperature, the absolute humidity of the atmosphere, the monthly and the average daily range of the barometer, and the average daily pressure of the atmosphere were **greater** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of cholera infantum (or of the other diseases named), these conditions were **less** than the average for the year. In Exhibit XIX., page 133, the letter *a* marks exceptions to this proposition for the year 1891.

Explanations of Propositions 1 and 2 are given on page 131, and a summary of the evidence of Exhibit XIX. is given in Exhibit XXV., on a following page.

PROPOSITION 2.—That in months when **more** than the average per cent of weekly reports stated the presence of cholera infantum (or of intermittent fever, remittent fever, typhoid fever, typho-malarial fever, measles, or whooping-cough), the relative humidity of the atmosphere, the average per cent of cloudiness, the ozone, and the average velocity of the wind were **less** than the average for the year; and that in months when **less** than the average per cent of reports stated the presence of cholera infantum (or of the other diseases named), these conditions were **greater** than the average for the year. In Exhibit XIX., page 133, the letter *b* marks exceptions to this proposition for 1891.

What per cent of all the weekly reports of sickness in each month in 1891 stated the presence of cholera infantum is graphically represented by months in Diagram 1, page 87. What per cent of the reports received by months in the fourteen years, 1877-90, stated presence of cholera infantum and of the other diseases mentioned in Propositions 1 and 2, is stated in Exhibit XX., page 134.

Cholera infantum was more prevalent during the hot months and in June and November,—August, September, July and October being the months in 1891 in which more than the average sickness from this disease was reported.

EXHIBIT XIX.—DIARRHEA AND CHOLERA INFANTUM.—*Stating for the Year and for each Month of the Year 1891, what Per Cent of the Weekly Reports of Sickness stated Presence of Diarrhea and Cholera Infantum and what were the Meteorological Conditions as observed at Stations in Michigan.**

	Months in Order of Greatest Per Cent of Weekly Reports Stating Presence of.	DIARRHEA. Per Cent of Weekly Reports stating Presence of.	DIARRHEA. Av. Order of Prevalence where Present. ††	Temperature, F. Av. Daily Range by Registering Thermometers.	Temperature, F. Average of Three Daily Observations.	Humidity of Air. § Av. of 3 Daily Observations. Relative Per Cent of Saturation.	Humidity of Air. § Av. of 3 Daily Observations. Absolute, — Grains of Vapor in a Cubic Foot of Air.	Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces. Inhaled. ‖	Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces. Exhaled in excess of that Inhaled. ¶	Average Per Cent of Cloudiness.	Ozone, Relative Scale of 10°. Day Observation, 7 A. M. to 2 P. M.	Ozone, Relative Scale of 10°. Night Observation, 9 P. M. to 7 A. M.	Av. Velocity of Wind, Miles per Hour by Anemometer.	Atmospheric Pressure, Inches Reduced to 32° F. Range. Monthly and for Year.	Atmospheric Pressure, Inches Reduced to 32° F. Range. Av. Daily by 3 Daily Observations. **	Atmospheric Pressure, Inches Reduced to 32° F. Average Pressure.
More than Av. Per Cent of Diarrhea.	Aug.	86	1.6	19.93	68.16	73	5.83	3.64	8.04	47	3.92	3.92	7.2	*a* .581	*a* .123	*a* 29.035
	Sept.	82	1.8	21.70	65.50	75	5.42	3.39	8.29	33	3.82	3.61	8.5	*a* .592	*a* .148	29.158
	July	68	2.0	21.33	66.67	70	5.30	3.31	8.37	38	3.94	4.15	8.5	*a* .543	*a* .132	*a* 29.055
	Oct.	62	2.1	18.18	49.01	75	*a* 3.37	2.11	9.57	52	3.85	3.92	*b* 10.1	*a* .802	*a* .200	29.105
Av.		47	2.7	18.01	47.61	77	3.54	2.21	9.57	55	3.99	4.22	9.9	.866	.202	29.057
Less than Av. Per Cent of Diarrhea.	June	38	2.6	*a*21.02	*a*67.62	*b* 73	*a* 5.86	3.66	8.02	*b* 48	4.10	4.37	*b* 7.4	.634	.120	29.015
	Nov.	35	2.8	13.65	34.57	84	2.32	1.45	10.23	80	*b* 3.45	*b* 3.51	11.7	*a*1.263	*a* .266	29.048
	May	37	3.2	*a*23.16	*a*55.40	*b* 66	*a* 3.67	2.29	9.39	*b* 40	4.40	4.41	*b* 9.7	.489	.130	*a* 29.118
	Mar.	31	3.7	14.90	28.93	83	1.79	1.12	10.56	67	4.46	4.91	11.2	*a*1.014	*a* .259	*a* 29.063
	Jan.	31	3.9	12.90	26.90	87	1.77	1.11	10.57	79	4.20	4.03	*b* 8.6	*a*1.420	*a* .241	29.041
	Apr.	30	4.0	*a*19.57	47.11	*b* 74	3.19	1.99	9.69	*b* 50	4.02	4.83	9.9	.677	.192	29.025
	Dec.	28	3.3	14.04	34.11	80	2.14	1.34	10.34	57	*b* 3.59	*b* 4.19	13.4	*a*1.171	*a* .277	29.028
	Feb.	27	4.1	15.76	27.83	84	1.84	1.15	10.53	70	4.18	4.86	12.1	*a*1.209	*a* .337	28.993
CHOLERA INFANTUM.																
More than Av. Pr. Ct. of Cholera Infantum.	Aug.	43	3.2	19.93	68.16	73	5.83	3.64	8.04	47	3.92	3.92	7.2	*a* .581	*a* .123	*a* 29.035
	Sept.	41	3.2	21.70	65.50	75	5.42	3.39	8.29	33	3.82	3.61	8.5	*a* .592	*a* .148	29.158
	July	27	3.9	21.33	66.67	70	5.30	3.31	8.37	38	3.94	4.15	8.5	*a* .543	*a* .132	*a* 29.055
	Oct.	14	3.8	18.18	49.01	75	*a* 3.37	2.11	9.57	52	3.85	3.92	*b* 10.1	*a* .802	*a* .200	29.105
Av.		13	3.6	18.01	47.61	77	3.54	2.21	9.57	55	3.99	4.22	9.9	.866	.202	29.057
Less than Av. Per Cent of Cholera Infantum.	June	7	3.6	*a*21.02	*a*67.62	*b* 73	*a* 5.86	3.66	8.02	*b* 48	4.10	4.37	*b* 7.4	.634	.120	29.015
	Dec.	3	3.4	14.04	34.11	80	2.14	1.34	10.34	57	*b* 3.59	*b* 4.19	13.4	*a*1.171	*a* .277	29.028
	Nov.	3	4.3	13.65	34.57	84	2.32	1.45	10.23	80	*b* 3.45	*b* 3.51	11.7	*a*1.263	*a* .266	29.048
	Feb.	2	4.3	15.76	27.83	84	1.84	1.15	10.53	70	4.18	4.86	12.1	*a*1.209	*a* .337	28.993
	May	2	5.8	*a*23.16	*a*55.40	*b* 66	*a* 3.67	2.29	9.39	*b* 40	4.40	4.41	*b* 9.7	.489	.130	*a* 29.118
	Jan.	2	6.2	12.90	26.90	87	1.77	1.11	10.57	79	4.20	*b* 4.03	*b* 8.6	*a*1.420	*a* .241	29.041
	Mar.	0.3	9.0	14.90	28.93	83	1.79	1.12	10.50	67	4 46	4.91	11.2	*a*1.014	*a* .259	*a* 29.063
	April	0.3	9.0	*a*19.57	47.11	*b* 74	3.19	1.99	9.69	*b* 50	4.02	4.83	9.9	.677	.192	29.025

*, †, ‡, §, ‖, ¶, **. For foot-notes with these marks, see Exhibit X., page 120.
a An exception to proposition 1, relating to Diarrhea and Cholera Infantum on page 129.
b An exception to proposition 2, relating to Diarrhea and Cholera Infantum on page 131.

EXHIBIT XX.—***By Year and Months for 1891 and for the preceding year, and an Average for the fourteen years, 1877-90, also for the five years, 1886-1890. Stating on what Per Cent of the Weekly Reports received*** DIARRHEA, CHOLERA INFANTUM, INTERMITTENT FEVER, REMITTENT FEVER, TYPHOID FEVER, TYPHO-MALARIAL FEVER, MEASLES, WHOOPING-COUGH, CHOLERA MORBUS AND DYSENTERY ***were Reported Present, and Comparing the Per Cents for 1891, with the Averages for Corresponding Months in those years.****

Years, etc.	Year.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Diarrhea.													
Av. 14 years, 1877-1890	46	27	28	29	31	35	44	72	85	79	54	35	28
Av. 5 years, 1886-1890	45	26	28	29	30	33	41	66	82	75	49	33	27
1890	44	27	28	31	28	29	42	68	82	71	54	31	27
1891	47	31	27	31	30	37	38	63	86	82	62	38	28
In 1891 Greater than Av. 1877-1890	1	4	..	2	..	2	..	..	1	3	8	3	=
In 1891 Less than Av. 1877-90	..	..	1	..	1	..	6	9	..	..	..	..	=
In 1891 Greater than Av. 1886-1890†	2	5	..	2	=	4	..	..	4	7	13	5	1
In 1891 Less than Av. 1886-90†	..	..	1	..	=	..	3	6	..	..	..	..	..
Cholera Infantum.													
Av. 14 years, 1877-1890	13	2	1	2	2	3	10	30	46	34	12	4	2
Av. 5 years, 1886-1890	12	2	1	2	1	3	9	28	44	32	9	3	2
1890	10	1	0.3	1	1	3	7	23	43	26	8	3	3
1891	13	2	2	0.3	0.3	2	7	27	43	41	14	3	3
In 1891 Greater than Av. 1877-1890	=	=	1	..	..	..	..	..	..	7	2	..	1
In 1891 Less than Av. 1877-90	=	=	..	1.7	1.7	1	3	3	3	..	..	1	..
In 1891 Greater than Av. 1886-1890†	1	=	1	..	..	..	..	..	..	9	5	=	1
In 1891 Less than Av. 1886-90†	..	=	..	1.7	0.7	1	2	1	1	..	..	=	..
Intermittent Fever.													
Av. 14 years, 1877-1890	64	52	54	57	64	69	71	72	72	72	70	62	55
Av. 5 years, 1886-1890	46	39	40	42	49	47	49	51	52	50	49	44	39
1890	41	33	33	33	40	40	43	44	48	43	45	44	36
1891	36	36	33	33	33	34	36	44	45	42	38	34	25
In 1891 Greater than Av. 1877-1890	..	..	..	..	..	..	..	..	..	..	..	..	..
In 1891 Less than Av. 1877-90	28	16	21	24	31	35	35	28	27	30	32	28	30
In 1891 Greater than Av. 1886-1890†	..	..	..	..	..	..	..	..	..	..	..	..	..
In 1891 Less than Av. 1886-90†	10	3	7	9	16	13	13	7	7	8	11	10	14
Remittent Fever.													
Av. 14 years, 1877-1890	43	36	35	37	40	41	42	45	52	54	52	44	38
Av. 5 years, 1886-1890	31	28	26	27	30	29	29	31	37	39	37	32	29
1890	27	22	19	20	23	26	26	30	33	31	31	33	29
1891	28	31	28	26	25	28	21	28	34	33	37	30	28
In 1891 Greater than Av. 1877-1890	..	..	..	..	..	..	..	..	..	..	..	..	..
In 1891 Less than Av. 1877-90	15	5	7	11	15	18	21	17	18	21	15	14	15
In 1891 Greater than Av. 1886-1890†	..	..	..	..	..	..	..	..	..	..	..	..	..
In 1891 Less than Av. 1886-90†	3	..	..	1	5	6	8	3	3	6	=	2	6
Typhoid Fever.													
Av. 14 years, 1877-1890	11	10	8	6	5	5	5	7	13	20	21	19	14
Av. 5 years, 1886-1890	9	7	5	4	3	4	5	6	13	18	18	14	10
1890	8	6	1	2	2	2	5	6	15	15	16	13	7
1891	11	5	5	2	2	3	3	6	12	21	27	21	15
In 1891 Greater than Av. 1877-1890	=	..	..	..	..	..	..	..	1	6	2	1	..
In 1891 Less than Av. 1877-90	=	5	3	4	3	2	2	1	1	..	..	..	..
In 1891 Greater than Av. 1886-1890†	2	..	=	..	..	..	..	=	..	3	9	7	5
In 1891 Less than Av. 1886-90†	..	2	=	2	1	1	2	=	1	..	..	..	..
Typho-malarial Fever.													
Av. 14 years, 1877-1890	20	15	13	12	11	11	11	14	23	35	38	28	19
Av. 5 years, 1886-1890	14	9	8	8	10	8	8	10	19	28	26	17	11
1890	7	4	2	2	5	6	3	6	14	12	12	7	6
1891	6	7	5	5	2	2	2	3	6	9	17	7	2
In 1891 Greater than Av. 1877-1890	..	..	..	..	..	..	..	..	..	..	..	..	..
In 1891 Less than Av. 1877-90	14	8	8	7	9	9	9	11	17	27	21	21	17
In 1891 Greater than Av. 1886-1890†	..	..	..	..	..	..	..	..	..	..	..	..	..
In 1891 Less than Av. 1886-90†	8	2	3	3	8	6	6	7	13	17	9	10	9
Measles.													
Av. 14 years, 1877-1890	12	11	14	16	21	25	21	13	6	4	4	6	7
Av. 5 years, 1886-1890	11	10	14	16	18	21	18	10	4	3	4	5	7
1890	12	12	19	19	21	22	22	16	5	3	4	4	7
1891	10	8	12	24	28	23	18	9	5	1	1	1	1
In 1891 Greater than Av. 1877-90	..	..	..	8	7	..	3	..	..	..	..	..	..
In 1891 Less than Av. 1877-90	2	3	2	..	..	2	..	4	1	3	3	5	6
In 1891 Greater than Av. 1886-90†	..	..	..	8	10	2	=	..	1	..	..	..	..
In 1891 Less than Av 1886-90†	1	2	2	..	..	..	=	1	..	2	3	4	6
Whooping-cough.													
Av. 14 years, 1877-1890	18	18	18	18	17	18	18	20	20	19	16	17	16
Av. 5 years, 1886-1890	14	12	14	15	15	17	14	17	15	14	11	10	10
1890	9	10	13	12	13	15	9	12	10	6	3	5	5
1891	9	4	4	5	6	7	7	11	14	12	11	12	9
In 1891 Greater than Av. 1877-90	..	..	..	..	..	..	..	..	..	..	..	..	..
In 1891 Less than Av. 1877-90	9	14	14	13	11	11	11	9	6	7	5	5	7
In 1891 Greater than Av. 1886-90†	..	..	..	..	..	..	..	..	..	..	=	2	..
In 1891 Less than Av. 1886-90†	5	8	10	10	9	10	7	6	1	2	=	..	1
Cholera Morbus.													
Av. 14 years, 1877-90	18	4	4	5	5	8	17	45	56	38	14	6	5
Av. 5 years, 1886-90	16	3	2	3	4	7	14	40	54	36	11	5	4
1890	15	1	3	2	3	4	11	37	54	34	11	6	5
1891	16	4	4	5	5	6	15	34	52	37	18	7	5
In 1891 Greater than Av. 1877-90	..	=	=	=	=	..	..	..	..	..	4	1	=
In 1891 Less than Av. 1877-90	2	=	=	=	=	2	2	11	4	1	..	..	=
In 1891 Greater than Av. 1886-90†	=	1	2	2	1	..	1	..	..	1	7	2	1
In 1891 Less than Av. 1886-90†	=	..	..	..	..	1	..	6	2	..	..	..	..
Dysentery.													
Av. 14 years, 1877-1890	19	7	7	7	8	9	13	30	53	47	23	11	7
Av. 5 years, 1886-1890	17	6	7	7	7	9	10	26	49	43	19	10	7
1890	16	6	7	6	6	8	13	23	41	40	18	9	7
1891	16	5	6	5	6	9	10	20	42	40	26	11	9
In 1891 Greater than Av. 1877-90	..	..	..	..	..	..	=	..	..	..	3	=	2
In 1891 Less than Av. 1877-90	3	2	1	2	2	=	3	10	11	7	..	=	..
In 1891 Greater than Av. 1886-90†	..	..	..	..	..	=	=	..	..	..	7	1	2
In 1891 Less than Av. 1886-90†	1	1	1	2	1	=	=	6	7	3	..	..	..

* Other statements for 1891, and months in 1891, relative to these diseases are given in Table 2, pages 98–107, and in Exhibits XIX., XXI., XXII., XXIII., and XXIV., pages 133, 135, 137, 138 and 139, where are also given for convenient comparison statements of coincident meteorological conditions. The lines for 1891 are graphically represented in Diagrams 1, page 87; 3, page 124, and 5, page 135.

† This comparison is made because of change of plan of reports in May, 1885, as explained on pages 80–1.

DIAGRAM 5.—WEEKLY REPORTS OF DISEASES IN MICHIGAN, IN 1891.

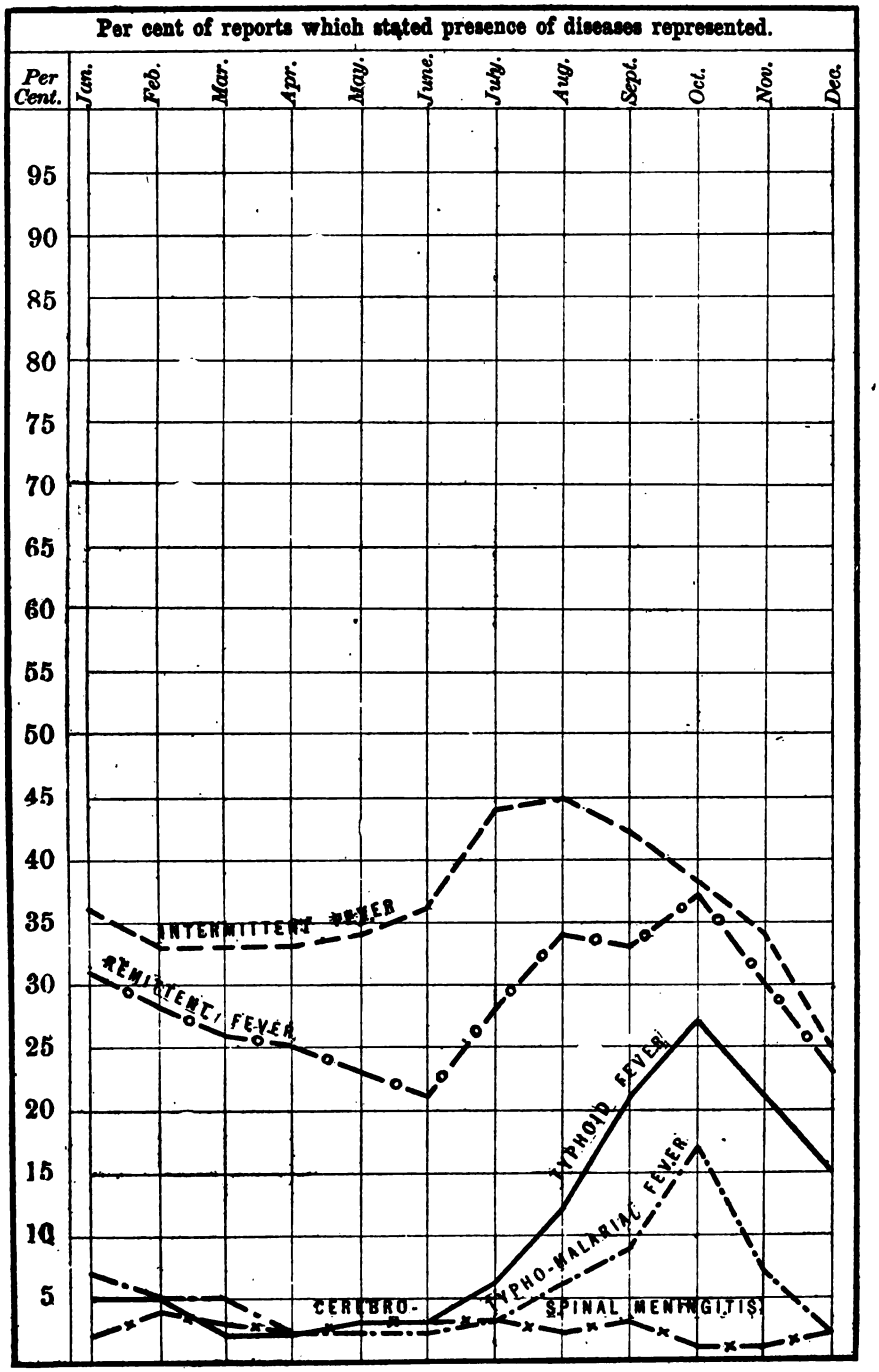


EXHIBIT XXI.—INTERMITTENT FEVER AND REMITTENT FEVER.—*Stating for the Year and for each Month of the Year 1891, what Per Cent of the Weekly Reports of Sickness Stated Presence of Intermittent Fever and Remittent Fever, and what were the Meteorological Conditions as observed at Stations in Michigan.**

Intermittent Fever. Months in Order of Greatest Per Cent of Weekly Reports Stating Presence of.	Per Cent of Weekly Reports Stating Presence of.	Av. Order of Prevalence where Present. †‡	Temperature, F. Av. Daily Range by Registering Thermometers.	Temperature, F. Average of Three Daily Observations.	Humidity of Air. § Av. of 3 Daily Observations. Relative Per Cent of Saturation.	Humidity of Air. § Av. of 3 Daily Observations. Absolute,—Grains of Vapor in a Cubic Foot of Air.	Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces. Inhaled. ‖	Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces. Exhaled in excess of that Inhaled. ¶	Average Per Cent of Cloudiness.	Ozone, Relative Scale of 10°. Day Observation, 7 A. M. to 2 P. M.	Ozone, Relative Scale of 10°. Night Observation, 9 P. M. to 7 A. M.	Av. Velocity of Wind, Miles per Hour by Anemometer.	Atmospheric Pressure, Inches Reduced to 32° F. Range. Monthly and for Year.	Atmospheric Pressure, Inches Reduced to 32° F. Range. Av. Daily by 3 Daily Observations.**	Atmospheric Pressure, Inches Reduced to 32° F. Average Pressure.
More than Av. Per Cent of Intermittent Fever. Aug.	45	2.8	19.93	68.16	73	5.83	3.64	8.04	47	3.92	3.92	7.2	a .581	a .123	a 29.085
July	44	2.8	21.33	66.67	70	5.30	3.31	8.37	38	3.94	4.15	8.5	a .543	.132	a 29.055
Sept.	42	2.8	21.70	65.50	75	5.42	3.39	8.29	33	3.82	3.61	8.5	a .592	a .148	29.158
Oct.	38	2.8	18.18	49.01	75	a 3.37	2.11	9.57	52	3.85	3.92	b 10.1	a .802	a .200	29.105
June	36	2.6	21.02	67.62	73	5.86	3.66	8.02	48	b 4.10	b 4.37	7.4	a .634	a .120	a 29.015
Av.	36	3.2	18.01	47.61	77	3.54	2.21	9.57	55	3.99	4.22	9.9	.866	.202	29.057
Less than Av. Per Cent of Intermittent Fever. Jan.	36	3.7	12.90	26.90	87	1.77	1.11	10.57	79	4.20	b 4.03	b 8.6	a1.420	a .241	29.041
Nov.	34	2.8	13.65	34.57	84	2.32	1.45	10.23	80	b 3.45	b 3.51	11.7	a1.263	a .266	29.048
May	34	3.5	a23.16	a55.40	b 66	a 3.67	2.29	9.39	b 40	4.40	4.41	b 9.7	.489	.130	a 29.118
Feb.	33	3.7	15.76	27.33	84	1.84	1.15	10.53	70	4.18	4.86	12.1	a1.209	a .337	28.993
April	33	3.9	a19.57	b47.11	b 74	3.19	1.99	9.69	b 50	4.02	4.83	9.9	.677	.192	29.025
March	33	4.0	14.90	28.93	83	1.79	1.12	10.56	67	4.46	4.91	11.2	a1.014	a .259	a29.063
Dec.	25	3.6	14.04	34.11	80	2.14	1.34	10.34	57	b 3.59	b 4.19	13.4	a1.171	a .277	29.028
Remittent Fever.															
More than Av. Per Cent of Remittent Fever. Oct.	37	2.6	18.18	49.01	75	a 3.37	2.11	9.57	52	3.85	3.92	b 10.1	a .802	a .200	29.105
Aug.	34	3.1	19.93	68.16	73	5.83	3.64	8.04	47	3.92	3.92	7.2	a.581	a .123	a 29.035
Sept.	33	2.7	21.70	65.50	75	5.42	3.39	8.29	33	3.82	3.61	8.5	a .592	a .148	29.158
Jan.	31	3.7	a12.90	a26.90	b 87	a 1.77	1.11	10.57	b 79	b 4.20	4.03	8.6	1.420	.241	a 29.041
Nov.	30	2.7	13.65	a31.57	b 84	a 2.32	1.45	10.23	b 80	3.45	3.51	b 11.7	1.263	.266	a 29.048
July	28	2.7	21.33	66.67	70	5.30	3.31	8.37	38	3.94	4.15	8.5	a .543	a .132	a 29.055
Av.	28	3.3	18.01	47.61	77	3.54	2.21	9.57	55	3.99	4.22	9.9	.866	.202	29.057
Less than Av. Per Cent of Remittent Fever. Feb.	28	4.1	15.76	27.33	84	1.84	1.15	10.53	70	4.18	4.86	12.1	a1.209	a .337	28.993
March	26	4.5	14.90	28.93	83	1.79	1.12	10.56	67	4.46	4.91	11.2	1.014	a .259	a 29.063
April	25	4.5	a19.57	47.11	b 74	3.19	1.99	9.69	b 50	4.02	4.83	9.9	.677	.192	29.025
Dec.	23	3.4	14.04	34.11	80	2.14	1.34	10 34	57	b 3.59	b 4.19	13.4	a1.171	a. 277	29.028
May	23	3.5	a23.16	a55.40	b 66	a 3.67	2.29	9.39	b 40	4.40	4.41	b 9.7	.489	.130	a 29.118
June	21	2.8	a21.02	a67.62	b 73	a 5.86	3.66	8.02	b 48	4.10	4.37	b 7.4	.634	.120	29.015

*, †, ‡, §, ‖, ¶, **. For foot-notes with these marks, see Exhibit X, page 120.
a An exception to Proposition 1, relating to Intermittent Fever and Remittent Fever, on page 132.
b An exception to Proposition 2, relating to Intermittent Fever and Remittent Fever, on page 132.

EXHIBIT XXII.—TYPHOID FEVER AND TYPHO-MALARIAL FEVER.—*Stating for the Year and for each Month of the Year 1891, what Per Cent of the Weekly Reports of Sickness Stated Presence of Typhoid Fever and Typho-Malarial Fever, and what were the Meteorological Conditions as observed at Stations in Michigan.

	Months in Order of Greatest Per Cent of Weekly Reports Stating Presence of.	Per Cent of Weekly Reports Stating Presence of.	Av. Order of Prevalence where Present. †‡	Temperature, F. Av. Daily Range by Registering Thermometers.	Temperature, F. Average of Three Daily Observations.	Humidity of Air.§ Av. of 3 Daily Observations. Relative Per Cent of Saturation.	Humidity of Air.§ Av. of 3 Daily Observations. Absolute.—Grains of Vapor in a Cubic Foot of Air.	Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces. Inhaled. ‖	Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces. Exhaled in excess of that Inhaled. ¶	Average Per Cent of Cloudiness.	Ozone, Relative Scale of 10°. Day Observation, 7 A. M. to 2 P. M.	Ozone, Relative Scale of 10°. Night Observation, 9 P. M. to 7 A. M.	Av. Velocity of Wind, Miles per Hour by Anemometer.	Atmospheric Pressure, Inches Reduced to 32° F. Range. Monthly and for Year.	Atmospheric Pressure, Inches Reduced to 32° F. Range. Av. Daily by 3 Daily Observations.**	Atmospheric Pressure, Inches Reduced to 32° F. Average Pressure.
TYPHOID FEVER.																
More than Av. Per Cent of Typhoid Fever.	Oct.	27	2.8	18.18	49.01	75	a 3.37	2.11	9.57	52	3.85	3.92	b 10.1	a .802	a .200	29.105
	Nov.	21	2.9	a13.65	a34.57	b 84	a 2.32	1.45	10.23	b 80	3.45	3.51	b 11.7	1.263	.266	a 29.048
	Sept.	21	3.4	21.70	65.50	75	5.42	3.39	8.29	33	3.82	3.61	8.5	a .592	a .148	29.158
	Dec.	15	3.8	a14.01	a34.11	b 80	a 2.14	1.34	10.34	b 57	3.59	4.19	b 13.4	1.171	.277	a 29.028
	Aug.	12	4.0	19.93	68.16	73	5.83	3.64	8.04	47	3.92	3.92	7.2	a .581	a .123	a 29.035
Av.		11	3.5	18.01	47.61	77	3.54	2.21	9.57	55	3.99	4.22	9.9	.866	.202	29.057
Less than Av. Per Cent of Typhoid Fever.	July.	6	3.5	a21.33	a66.67	b 70	a 5.30	3.31	8.37	b 38	b 3.94	b 4.15	b 8.5	.543	.132	29.055
	Feb.	5	4.2	15.76	27.33	84	1.84	1.15	10.53	70	4.18	4.86	12.1	a1.209	a .337	28.993
	Jan.	5	4.6	12.90	26.90	87	1.77	1.11	10.57	79	4.20	b 4.03	b 8.6	a1.420	a .241	29.041
	June	3	3.4	a21.02	a67.62	b 73	a 5.86	3.66	8.02	b 48	4.10	4.37	b 7.4	.634	.120	29.015
	May	3	4.3	a23.16	a55.40	b 66	a 3.67	2.29	9.39	b 40	4.40	4.41	b 9.7	.489	.130	a 29.118
	Mar.	2	3.3	14.90	28.93	83	1.79	1.12	10.56	67	4.46	4.91	11.2	a1.014	a .259	a 29.063
	April	2	5.8	a19.57	47.11	b 74	3.19	1.99	9.69	b 50	4.02	4.83	9.9	.677	.192	29.025
TYPHO-MAL. FEVER.																
More than Av. Per Cent of Typho-mal. Fever.	Oct.	17	2.9	18.18	49.01	75	a 3.37	2.11	9.57	52	3.85	3.92	b 10.1	a .802	a .200	29.105
	Sept.	9	3.3	21.70	65.50	75	5.42	3.39	8.29	33	3.82	3.61	8.5	a .592	a .148	29.158
	Nov.	7	3.4	a13.65	a34.57	b 84	a 2.32	1.45	10.23	b 80	3.45	3.51	b 11.7	1.263	.266	a 29.048
	Jan.	7	5.3	a12.90	a26.90	b 87	a 1.77	1.11	10.57	b 79	b 4.20	4.03	8.6	1.420	.241	a 29.041
	Aug.	6	2.7	19.93	68.16	73	5.83	3.64	8.04	47	3.92	3.92	7.2	a .581	a .123	a 29.035
Av.		6	3.6	18.01	47.61	77	3.54	2.21	9.57	55	3.99	4.22	9.9	.866	.202	29.057
Less than Av. Per Cent of Typho-mal. Fever.	Mar.	5	4.0	14.90	28.93	83	1.79	1.12	10.56	67	4.46	4.91	11.2	a1.014	a .259	a 29.063
	Feb.	5	5.4	15.76	27.33	84	1.84	1.15	10.53	70	4.18	4.86	12.1	a1.209	a .337	28.993
	July.	3	3.3	a21.33	a66.67	b 70	a 5.30	3.31	8.37	b 38	b 3.94	b 4.15	b 8.5	.543	.132	29.055
	May	2	2.5	a23.16	a55.40	b 66	a 3.67	2.29	9.39	b 40	4.40	4.41	b 9.7	.489	.130	a 29.118
	June	2	2.8	a21.02	a67.62	b 73	a 5.86	3.66	8.02	b 48	4.10	4.37	b 7.4	.634	.120	29.015
	Dec.	2	4.8	14.04	34.11	80	2.14	1.34	10.34	57	b 3.59	b 4.19	13.4	a1.171	a .277	29.028
	April	2	7.0	a19.57	47.11	b 74	3.19	1.99	9.69	b 50	4.02	4.83	9.9	.677	.192	29.025

*, †, ‡, §, ‖, ¶, **. For foot-notes with these marks, see Exhibit X, on page 120.
a An exception to Proposition 1, relating to Typhoid Fever and Typho-malarial Fever, on page 132.
b An exception to Proposition 2, relating to Typhoid Fever and Typho-malarial Fever, on page 132.

EXHIBIT XXIII.—MEASLES AND WHOOPING-COUGH.—*Stating for the Year and for each Month of the Year 1891, what Per Cent of the Weekly Reports of sickness stated Presence of Measles and Whooping-cough, and what were the Meteorological Conditions as observed at Stations in Michigan.**

	Measles. Months in Order of Greatest Per Cent of Weekly Reports Stating Presence of.	Per Cent of Weekly Reports Stating Presence of.	Av. Order of Prevalence where Present. †‡	Temperature, F. Av. Daily Range by Registering Thermometers.	Temperature, F. Average of Three Daily Observations.	Humidity of Air.§ Av. of 3 Daily Observations. Relative Per Cent of Saturation.	Humidity of Air.§ Av. of 3 Daily Observations. Absolute, — Grains of Vapor in a Cubic Foot of Air.	Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces. Inhaled.‖	Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces. Exhaled in excess of that Inhaled.¶	Average Per Cent of Cloudiness.	Ozone, Relative Scale of 10°. Day Observation, 7 A. M. to 2 P. M.	Ozone, Relative Scale of 10°. Night Observation, 9 P. M. to 7 A. M.	Av. Velocity of Wind, Miles per Hour by Anemometer.	Atmospheric Pressure, Inches Reduced to 32° F. Range. Monthly and for Year.	Atmospheric Pressure, Inches Reduced to 32° F. Range. Av. Daily by 3 Daily Observations.**	Atmospheric Pressure, Inches Reduced to 32° F. Average Pressure.
More than Av. Per Cent of Measles.	April	28	3.2	19.57	a47.11	74	a 3.19	1.99	9.69	50	b 4.02	b 4.83	9.9	a .677	a .192	a 29.025
	Mar.	24	3.1	a14.90	a28.93	b 83	a 1.79	1.12	10.56	b 67	b 4.46	b 4.91	b 11.2	1.014	.259	29.063
	May	23	2.3	23.16	55.40	66	3.67	2.29	9.39	40	b 4.40	b 4.41	9.7	a .489	a .130	29.118
	June	18	2.4	21.02	67.62	73	5.86	3.66	8.02	48	b 4.10	b 4.37	7.4	a .634	a .120	a 29.015
	Feb.	12	3.6	a15.76	a27.33	b 84	a 1.84	1.15	10.53	b 70	b 4.18	b 4.86	b 12.1	1.209	.337	a 28.993
Av.		10	3.0	18.01	47.61	77	3.54	2.21	9.57	55	3.99	4.22	9.9	.866	.202	29.057
Less than Av. Per Cent of Measles.	July	9	3.3	a21.33	a66.67	b 70	a 5.30	3.31	8.37	b 38	b 3.94	b 4.15	b 8.5	.543	.132	29.055
	Jan.	8	3.2	12.90	26.90	87	1.77	1.11	10.57	79	4.20	b 4.03	b 8.6	a1.420	a .241	29.041
	Aug.	5	3.4	a19.98	a68.16	b 73	a 5.88	3.64	8.04	b 47	b 3.92	b 3.92	b 7.2	.581	.123	29.035
	Oct.	1	1.0	a18.18	a49.01	b 75	3.37	2.11	9.57	b 52	b 3.85	b 3.92	10.1	.802	.200	a 29.105
	Nov.	1	2.5	13.65	34.57	84	2.32	1.45	10.23	80	b 3.45	b 3.51	11.7	a1.263	a .266	29.048
	Dec.	1	2.7	14.04	34.11	80	2.14	1.34	10.34	57	b 3.59	b 4.19	13.4	a1.171	a .277	29.028
	Sept.	1	3.3	a21.70	a65.50	b 75	a 5.42	3.39	8.29	b 33	b 3.82	b 3.61	b 8.5	.592	.148	a 29.158
	Whooping-cough.															
More than Av. Per Ct. of Whooping-cough.	Aug.	14	2.8	19.93	68.16	73	5.83	3.64	8.04	47	3.92	3.92	7.2	a .581	a .123	a 29.035
	Nov.	12	2.6	a13.65	a34.57	b 84	a 2.32	1.45	10.23	b 80	3.45	3.51	b 11.7	1.263	.266	a 29.048
	Sept.	12	2.7	21.70	65.50	75	5.42	3.39	8.29	33	3.82	3.61	8.5	a .592	a .148	29.158
	Oct.	11	1.9	18.18	49.01	75	a 3.37	2.11	9.57	52	3.85	3.92	b 10.1	a .802	a .200	29.105
	July	11	2.3	21.33	66.67	70	5.30	3.31	8.37	38	3.94	4.15	8.5	a .543	a .132	a 29.055
Av.		9	2.9	18.01	47.61	77	3.54	2.21	4.57	55	3.99	4.22	9.9	.866	.202	29.057
Less than Av. Per Cent of Whooping-cough.	Dec.	9	3.4	14.04	34.11	80	2.14	1.34	10.34	57	b 3.59	b 4.19	13.4	a1.171	a .277	29.028
	June	7	2.2	a21.02	a67.62	b 73	a 5.86	3.66	8.02	b 48	4.10	4.37	b 7.4	.634	.120	29.015
	May	7	3.6	a23.16	a55.40	b 66	a 3.67	2.29	9.39	b 40	4.40	4.41	b 9.7	.489	.130	a 29.118
	April	6	4.2	a19.57	47.11	b 74	3.19	1.99	9.69	b 50	4.02	4.83	9.9	.677	.192	29.025
	Mar.	5	3.2	14.90	28.93	83	1.79	1.12	10.56	67	4.46	4.91	11.2	a1.014	a .259	a 29.063
	Feb.	4	3.1	15.76	27.33	84	1.84	1.15	10.53	70	4.18	4.86	12.1	a1.209	a .337	28.993
	Jan.	4	4.5	12.90	26.90	87	1.77	1.11	10.57	79	4.20	b 4.03	b 8.6	a1.420	a .241	29.041

*, †, ‡, §, ‖, ¶, **. For foot-notes with these marks, see Exhibit X, page 120.
a An exception to Proposition 1, relating to Measles and Whooping-cough on page 132.
b An exception to Proposition 2, relating to Measles and Whooping-cough on page 132.

EXHIBIT XXIV.—CHOLERA MORBUS AND DYSENTERY.—*Stating for the Year and for each Month of the Year 1891, what Per Cent of the Weekly Reports of Sickness Stated Presence of Cholera Morbus and Dysentery, and what were the Meteorological Conditions as observed at Stations in Michigan.**

CHOLERA MORBUS.	Months in Order of Greatest Per Cent of Weekly Reports Stating Presence of.	Per Cent of Weekly Reports Stating Presence of.	Av. Order of Prevalence where present. †‡	Temperature, F. Av. Daily Range by Registering Thermometers.	Temperature, F. Average of Three Daily Observations.	Humidity of Air.§ Av. of 3 Daily Observations. Relative Per Cent of saturation.	Humidity of Air.§ Av. of 3 Daily Observations. Absolute,—Grains of Vapor in a Cubic Foot of Air.	Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces. Inhaled.‖	Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces. Exhaled in excess of that Inhaled.¶	Average Per Cent of Cloudiness.	Ozone, Relative Scale of 10°. Day Observation, 7 A. M. to 2 P. M.	Ozone, Relative Scale of 10°. Night Observation, 9 P. M. to 7 A. M.	Av. Velocity of Wind, Miles per Hour by Anemometer.	Atmospheric Pressure, Inches Reduced to 32° F. Range. Monthly and for year.	Atmospheric Pressure, Inches Reduced to 32° F. Range. Av. Daily by 3 Daily Observations.**	Atmospheric Pressure, Inches Reduced to 32° F. Average Pressure.
More than Av. Per Ct. of Cholera Morbus.	Aug.	52	2.8	19.93	68.16	73	5.83	3.64	8.04	47	3.92	3.92	7.2	*a* .581	*a* .128	*a* 29.035
	Sept.	37	3.1	21.70	65.50	75	5.42	3 39	8.29	33	3.82	3.61	8.5	*a* .592	*a* .148	29.158
	July	34	3.0	21.33	66.67	70	5.30	3.31	8.37	38	3.94	4.15	8.5	*a* .543	*a* .132	*a* 29.055
	Oct.	18	3.6	18.18	49.01	75	*a* 3.37	2.11	9.57	52	3.85	3.92	*b* 10.1	*a* .802	*a* .200	29.105
Av.		16	3.4	18.01	47.61	77	3.54	2.21	9.57	55	3.99	4.22	9.9	.866	.202	29.057
Less than Av. Per Cent of Cholera Morbus.	June	15	3.6	*a*21.02	*a*67.62	*b* 73	*a* 5.86	3.66	8.02	*b* 48	4.10	4.37	*b* 7.4	.634	.120	29.015
	Nov.	7	3.4	13.65	34.57	84	2.32	1.45	10.23	80	*b* 3.45	*b* 3.51	11.7	*a*1.263	*a* .266	29.048
	May	6	4.2	*a*23.16	*a*55.40	*b* 66	*a* 3.67	2.29	9.39	*b* 40	4.40	4.41	*b* 9.7	.489	.130	*a* 29.118
	March	5	3.8	14.90	28.93	83	1.79	1.12	10.56	67	.4.46	4.91	11.2	*a*1.014	*a* .259	*a* 29.063
	Dec.	5	4.1	14.04	34.11	80	2.14	1.34	10.34	57	*b* 3.59	4.19	13.4	*a*1.171	*a* .277	29.028
	April	5	4.6	*a*19.57	47.11	*b* 74	3.19	1.99	9.69	*b* 50	4.02	4.83	9.9	.677	.192	29.025
	Jan.	4	4.3	12.90	26.90	87	1.77	1.11	10.57	79	4.20	4.03	*b* 8.6	*a*1.420	*a* .241	29.041
	Feb.	4	4.4	15.76	27.33	84	1.84	1.15	10.53	70	4.18	4.86	12.1	*a*1.209	*a* .337	28.993
DYSENTERY.																
More than Av. Per Cent of Dysentery.	Aug.	42	3.4	19.93	68.16	73	5.83	3.64	8.04	47	3.92	3.92	7.2	*a* .581	*a* .128	*a* 29.035
	Sept.	40	3.0	21.70	65.50	75	5.42	3.39	8.29	33	3.82	3.61	8.5	*a* .592	*a* .148	29.158
	Oct.	26	3.3	18.18	49.01	75	*a* 3.37	2.11	9.57	52	3.85	3.92	*b* 10.1	*a* .802	*a* .200	29.105
	July	20	3.5	21.33	66.67	70	5.30	3.31	8.37	38	3.94	4.15	8.5	*a* .543	*a* .132	*a* 29.055
Av.		16	3.8	18.01	47.61	77	3.54	2.21	9.57	55	3.99	4.22	9.9	.866	.202	29.057
Less than Av. Per Cent of Dysentery.	Nov.	11	4.2	13.65	34.57	84	2.32	1.45	10.23	80	*b* 3.45	*b* 3.51	11.7	*a*1.263	*a* .266	29.048
	June	10	3.5	*a*21.02	*a*67.62	*b* 73	*a* 5.86	3.66	8.02	*b* 48	4.10	4.37	*b* 7.4	.634	.120	29.015
	May	9	4.5	*a*23.16	*a*55.40	*b* 66	*a* 3.67	2.29	9.39	*b* 40	4.40	4.41	*b* 9.7	.489	.130	*a* 29.118
	Dec.	9	4.8	14.04	34.11	80	2.14	1.34	10.34	57	*b* 3.59	*b* 4.19	13.4	*a*1.171	*a* .277	29.028
	Feb.	6	4.8	15.76	27.33	84	1.84	1.15	10.53	70	4.18	4.86	12.1	*a*1.209	*a* .337	28.993
	April	6	5.0	*a*19.57	47.11	*b* 74	3.19	1.99	9.69	*b* 50	4.02	4.83	9.9	.677	.192	29.025
	Jan.	5	5.2	12.90	26.90	87	1.77	1.11	10.57	79	4.20	*b* 4.03	*b* 8.6	*a*1.420	*a* .241	29.041
	Mar.	5	6.9	14.90	28.93	83	1.79	1.12	10.56	67	4.46	4.91	11.2	*a*1.014	*a* .259	*a* 29.063

*, †, ‡, §, ‖, ¶, **. For foot-notes with these marks see Exhibit X., page 120.
a An exception to Proposition 1, relating to Cholera Morbus and Dysentery, on page 132.
b An exception to Proposition 2, relating to Cholera Morbus and Dysentery, on page 132.

Cold-Weather Diseases.

EXHIBIT XXV.—*Summary relative to Propositions contained in Exhibits X., XII., XIV., XV., XVI., etc., (pages 120–129) concerning Relations by Months in 1891, between Greater or Less than usual Prevalence of Diseases Named, and Certain given Coincident Climatic Conditions.*

Diseases.	Months (inclusive) in which Diseases named were more than Usually Prevalent in 1891.	Months (inclusive) in which Diseases named were less than Usually Prevalent in 1891.	For the 12 months of the year 1891. Number of months in which Propositions hold true.*										
			That in Months when Diseases named were more than usually prevalent the conditions named below were Greater than usual, and in Months when Less than usually prevalent these conditions were Less than usual.									That in Months when Diseases named were more than usually prevalent the conditions named below were Lower than usual, and in mos. when the Diseases were Less than usually prevalent these conditions were higher than usual.	
			For Av. Daily Range of Temp.	Relative Humidity.	Av. Per Cent of Cloudiness.	Ozone.		Velocity of Wind.	Atmospheric Pressure.			Average Temp.	Absolute Humidity.
						Day.	Night.		Range.				
									Monthly.	Average Daily.	Average Daily.		
Bronchitis	Jan.-May, Dec.	June-Nov.	3	9	9	10	9	8	9	9	6	10	9
Pneumonia	Jan.-May, Dec.	June-Nov.	3	9	9	10	9	8	9	9	6	10	9
Membran. Croup.	Jan.-Mar., Nov., Dec.	June-Oct.	0	12	12	7	6	10	12	12	5	11	10
Diphtheria	Jan., July, Oct.-Dec.	Feb.-June, Aug., Sept.	4	8	8	3	2	8	8	8	5	7	8
Tonsillitis	Jan.-May, Nov., Dec.	June-Oct.	2	10	10	9	8	9	10	10	5	11	10
Influenza	Jan.-May, Dec.	June-Nov.	3	9	9	10	8	8	9	9	6	10	9
Scarlet Fever	Jan.-May, Sept., Oct.	June-Aug., Nov., Dec.	6	7	6	9	8	7	6	6	9	7	8
Rheumatism	Jan.-June	July-Dec.	5	7	7	12	11	6	7	7	6	8	7
Neuralgia	Jan.-June, Nov., Dec.	July-Oct.	3	9	9	10	9	8	9	9	4	10	9
Consumption	Jan.-May	June-Dec.	4	8	8	11	10	7	8	8	7	9	8
Pleuritis	Jan.-May, Nov., Dec.	June-Oct.	2	10	10	9	8	9	10	10	5	11	10

* The figures in each of these 11 columns show for how many months out of the twelve months in 1891, the proposition named over the column holds true, thus, concerning bronchitis, the proposition relative to average daily range of temperature held true in only three months out of the twelve; that relative to average temperature, in ten out of twelve, etc.

Warm-Weather Diseases.

EXHIBIT XXVI.—*Summary Relative to Propositions contained in Exhibits XIX., XXI., etc., (pages 133–136, etc.), concerning Relations, by Months in 1891, between Greater or Less than Usual Prevalence of Diseases named, and certain given coincident Climatic Conditions.*

Diseases.	Months (inclusive) in which Diseases named were more than Usually Prevalent in 1891.	Months (inclusive) in which Diseases named were less than Usually Prevalent in 1891.	For the 12 Months of the Year 1891. Number of Months in which Propositions hold true.*										
			That in Months when Diseases named were More Prevalent than Usual the Conditions named below were Higher than Usual, and in Months when the Diseases were less Prevalent than usual these Conditions were Lower than Usual.						That in Months when Diseases named were More Prevalent than Usual the Conditions named below were less than Usual, and in Months when the Diseases were Less Prevalent than Usual these Conditions were Greater than Usual.				
			Av. Daily Range of Temp.	Average Temperature.	Absolute Humidity.	Atmospheric Pressure. Range. Monthly.	Atmospheric Pressure. Range. Av. Daily.	Atmospheric Pressure. Average Daily.	Relative Humidity.	Av. Per Cent of Cloudiness.	Ozone. Day.	Ozone. Night.	Velocity of Wind.
Diarrhea	July-Oct.	Jan.-June, Nov., Dec.	9	10	9	3	3	8	9	9	10	10	8
Cholera infantum	July-Oct.	Jan.-June, Nov., Dec.	9	10	9	3	3	8	9	9	10	9	8
Intermittent Fev.	June-Oct.	Jan.-May, Nov., Dec.	10	11	10	2	2	7	10	10	9	8	9
Remittent Fever.	Jan., July-Nov.	Feb.-June, Dec.	7	8	7	5	5	6	7	7	10	11	8
Typhoid Fever	Aug.-Dec.	Jan.-July	6	7	6	6	6	7	6	6	11	10	5
Typho-mal. Fever	Jan., Aug.-Nov.	Feb.-July, Dec.	6	7	6	6	6	7	6	6	9	10	7
Measles	Feb.-June	Jan., July-Dec.	6	5	6	6	6	6	6	6	1	0	6
Whooping-cough.	July-Nov.	Jan.-June, Dec.	8	9	8	4	4	7	8	8	11	10	7
Cholera morbus.	July-Oct.	Jan.-June, Nov., Dec.	9	10	9	3	3	8	9	9	10	11	8
Dysentery	July-Oct.	Jan.-June, Nov., Dec.	9	10	9	3	3	8	9	9	10	9	8
Av. Disease	Jan.-May, Aug., Sept.	June, July, Oct.-Dec.	6	5	6	6	6	7	6	6	8	4	8

* The figures in each of these 11 columns show for how many months out of the twelve months in 1891 the proposition named over the column holds true; thus, concerning diarrhea, the propostion relative to average daily range of temperature held true in nine months out of the twelve; that relative to absolute humidity nine months out of the twelve, etc.

TOTAL SICKNESS—AVERAGE DISEASE.

"Average disease" is an average of the tabulated diseases reported present on all the cards received and compiled at this office during the year. It is probably equivalent to the actual sickness from all diseases printed on the report cards, and probably represents very nearly the average sickness from all the diseases in the State. A sample of the report cards on which diseases are reported to this office is found on page 81. Twenty-eight diseases are printed on the cards. In 1891 there were 4,291 of these card reports received. On some of the cards only one or two diseases were reported present; on others twenty or more were reported present. Had each disease (printed on this card, and only the twenty-eight thus named) been reported present on every card received at this office, there would have been 120,148 reports of diseases present. (This is the product of 4,291 reports received multiplied by 28, the number of diseases printed on the cards, or 100 per cent of the possible disease reports.) There were actually present on the cards received at this office only 28,741 disease reports which 28,741÷120,148 of the possible disease reports that might have been present, is 24 per cent. This 24 per cent represents the actual sickness in the State from the tabulated diseases reported present, or in other words the sickness from "average disease." (See Diagram 4, page 130.)

Exhibit XXVII. serves to indicate the probable actual sickness in the State from the tabulated diseases in each year from 1877 to 1891. It compares the sickness in 1891 by months with the sickness by months in each of the fourteen years 1877 to 1890. It also compares the sickness in 1891, by months with the sickness, by months, in each of the five years 1886–1890. This last comparison is made because of the change in the plan of reports, which occurred in May, 1885, since which time the plan has been to have reported only the sickness actually observed by the physician who reports. Previous to May, 1885, some reported sickness that, by conference with other physicians, they believed to have occurred. Since May, 1885, the subject is placed upon a scientific basis.

By Exhibit XXVII., it will be seen that the sickness reported in 1891, was, for the year, and for each month of the year, considerably less than the average reported for the fourteen years 1877–90. That exhibit also shows that, for the year, and for the months of May and December the sickness reported in Michigan in the year 1891, was the same, for January, February, March and April it was more, and for the six months June to November it was less than the average for the five years, 1886–1890.

EXHIBIT XXVII.—SICKNESS FROM AVERAGE DISEASE, 1877-91.—*By Year and Months for each of the Fifteen Years, 1877-91, Stating on an Average for such of the 28 diseases tabulated as were reported present, what Per Cent of the Weekly Reports received stated presence of the Diseases, and comparing the Average Per Cents for Months in 1891, with the Averages for corresponding Months in the Years 1877-90; also comparing the Averages for the Months in 1891 with the Averages for corresponding Months in the five years 1886-1890.**

Years, Etc.	Annual Av.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Average 14 years, 1877-90	28	29	29	29	29	27	26	28	31	31	29	28	28
Average 5 years, 1886-90	25	25	25	26	26	25	23	25	27	27	25	24	24
1877	28	27	28	26	24	24	23	26	29	31	30	30	30
1878	30	30	30	31	29	28	26	28	32	35	34	30	32
1879	33	35	36	36	35	30	30	32	37	36	34	34	33
1880	32	32	32	32	31	30	31	34	36	35	32	30	31
1881	33	34	34	32	35	31	30	34	37	36	35	32	31
1882	30	31	30	30	30	29	28	28	30	34	32	31	29
1883	30	30	31	33	33	31	29	29	32	32	29	29	28
1884	29	28	29	30	28	28	29	31	34	34	33	30	29
1885	26	29	29	30	28	25	24	26	27	27	26	26	26
1886	26	26	26	28	27	26	23	26	27	28	25	25	25
1887	25	26	27	28	26	25	24	27	29	26	25	24	24
1888	24	24	26	27	26	24	23	22	25	25	23	22	23
1889	23	23	22	24	23	23	21	24	27	28	26	23	22
1890	25	26	26	25	26	25	23	24	27	26	25	25	27
1891 (Diagram 4, page 130.)	25	27	27	27	27	25	22	23	26	25	24	23	24
In 1891 Less than Av. 1877-90	3	2	2	2	2	2	4	5	5	6	5	5	4
In 1891 Greater than Av. 1886-90*	=	2	2	1	1	=	----	----	----	----	----	----	=
In 1891 Less than Av. 1886-90*	=	----	----	----	----	=	1	2	1	2	1	1	=

* This last comparison is made because of the change in the plan of making the reports, which occurred in May, 1885, as explained on pages 80-81.

RELATIONS OF TOTAL AMOUNT OF SICKNESS TO METEOROLOGICAL CONDITIONS.

PROPOSITION 1.—That in months when **more** than the average per cent of weekly reports stated the presence of such of the 28 diseases tabulated (in tables on pages 95-109) as were reported present, the average daily range of temperature, the average daily temperature, the absolute humidity of the atmosphere, the monthly and the average daily range of the barometer, and the average daily pressure of the atmosphere, were **greater** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of said diseases those conditions were **less** thsn the average for the year. In Exhibit XXVIII., below, the letter *a* marks exceptions to this proposition for the year 1891.

PROPOSITION 2.—That in months when **more** than the average per cent

of weekly reports stated the presence of such of the twenty-eight diseases tabulated as were reported present, the relative humidity of the atmosphere, the average per cent of cloudiness, the ozone, and the average velocity of the wind were **less** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of said diseases those conditions were **greater** than the average for the year. In Exhibit XXVIII., below, the letter *b* marks exceptions to this proposition for the year 1891.

What per cent of the weekly reports received in 1891 (on an average for such of the tabulated diseases as were reported present) stated presence of the diseases is graphically represented by months in Diagram 4, page 130.

EXHIBIT XXVIII.—AVERAGE DISEASE.—*Stating for the Year and for each Month of the Year 1891, what Per Cent of the Weekly Reports of Sickness Stated Presence of Average Disease, and what were the Meteorological Conditions as observed at Stations in Michigan.**

Average Disease.	Months in Order of Greatest Per Cent of Weekly Reports Stating Presence of.	Per Cent of Weekly Reports Stating Presence of.	Av. Order of Prevalence where Present. † ‡	Temperature, F.		Humidity of Air. § Av. of 3 Daily Observations.		Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces.		Average Per Cent of Cloudiness.	Ozone, Relative Scale of 10.°		Av. Velocity of Wind, Miles per Hour by Anemometer.	Atmospheric Pressure, Inches Reduced to 32° F.		
				Av. Daily Range by Registering Thermometers.	Average of Three Daily Observations.	Relative Per Cent of Saturation.	Absolute,—Grains of Vapor in a Cubic Foot of Air.	Inhaled. ‖	Exhaled in excess of that Inhaled. ¶		Day Observation, 7 A. M. to 2 P. M.	Night Observation, 9 P. M. to 7 A. M.		Range. Monthly and for Year.	Range. Av. Daily by 3 Daily Observations. **	Average Pressure.
More than Av. Per Cent of Average Disease.	Jan.	27	3.6	a12.90	a26.90	b 87	a 1.77	1.11	10.57	b 79	b 4.20	4.03	8.6	1.420	.241	a 29.041
	Feb.	27	3.6	a15.76	a27.33	b 84	a 1.84	1.15	10.53	b 70	b 4.18	b 4.86	b 12.1	1.209	.337	a 28.993
	Mar.	27	3.6	a14.90	a28.93	b 83	a 1.79	1.12	10.56	b 67	b 4.46	b 4.91	b 11.2	1.014	.259	29.063
	Apr.	27	3.7	19.57	a47.11	74	a 3.19	1.99	9.69	50	b 4.02	b 4.83	9.9	a .677	a .192	a 29.025
	Aug.	26	3.3	19.93	68.16	73	5.83	3.64	8.04	47	3.92	3.92	7.2	a .581	a .123	a 29.035
	Sept.	25	3.1	21.70	65.50	75	5.42	3.39	8.29	33	3.82	3.61	8.5	a .592	a .148	29.158
	May	25	3.3	23.16	55.40	66	3.67	2.29	9.39	40	b 4.40	b 4.41	9.7	a .489	a .130	29.118
Av.		25	3.3	18.01	47.61	77	3.54	2.21	9.57	55	3.99	4.22	9.9	.866	.202	29.057
Less than Av. Per Cent of Av. Disease.	Oct.	24	3.1	a18.18	a49.01	b 75	3.37	2.11	9.57	b 52	b 3.85	b 3.92	10.1	.802	.200	a 29.105
	Dec.	24	3.4	14.04	34.11	80	2.14	1.34	10.34	57	b 3.59	b 4.19	13.4	a1.171	a .277	29.028
	Nov.	23	3.0	13.65	34.57	84	2.32	1.45	10.23	80	b 3.45	b 3.51	11.7	a1.263	a .266	29.048
	July	23	3.1	a21.33	a66.67	b 70	a 5.30	3.31	8.37	b 38	b 3.94	b 4.15	b 8.5	.543	.132	29.055
	June	22	2.9	a21.02	a67.62	b 73	a 5.86	3.66	8.02	b 48	4.10	4.37	b 7.4	.634	.120	29.015

*, †, ‡, §, ‖, ¶, **. For foot-notes with these marks see Exhibit X., page 120.
a An exception to Proposition 1, relating to Average Disease on page 143.
b An exception to Proposition 2, relating to Average Disease on page 143, 144.

Exhibit XXVIII., continued for a series of years, should show what meteorological conditions are on the whole most conducive to health in Michigan, and what are most to be guarded against by residents of Michigan.

COMMUNICABLE DISEASES IN MICHIGAN DURING THE YEAR ENDING DECEMBER 31, 1891.

COMPILED UNDER THE DIRECTION OF THE SECRETARY OF THE STATE BOARD OF HEALTH.

This paper continues a subject treated for the preceding year on pages 147-256 of the Report of the State Board of Health for the year 1891, and for former years in the Reports for those years respectively.

Whenever information is received at this office of the outbreak (in any locality in Michigan) of diphtheria, scarlet fever, typhoid fever, small-pox, measles, whooping-cough, rabies, or glanders, a letter is sent to the health officer of the township, city or village in which the disease is reported to be present (if the name of the health officer has been reported to this office; if not, to the president of the Board of Health), calling his attention (if the report was not received from him) to the reported existence of the disease within his territory, indicating his duties and powers and proper measures to be taken in restricting the disease, transmitting documents of instruction with regard to prevention and restriction of the disease, for distribution among families especially exposed to it,* and asking for a report of the methods employed for the restriction of the disease, and the results of efforts for suppressing it—the number of cases and deaths in each outbreak. Except in the cases of typhoid fever, measles, whooping-cough, rabies and glanders, for which a special form of letter was employed, the form of the letter generally sent during the year 1891 was substantially the same as that printed on pages 251-252 of the Report of the State Board of Health for the year 1884. With this letter was sent a blank form (L) for notice of the first case of a dangerous communicable disease, a blank form (M) for weekly reports during the continuance of the disease, and a blank form (K) for special final report. Those now in use are substantially the same as those printed on pages 253-254 of the Report for 1884. The blank (K) for final report is printed on pages xiii.-xiv. of the Report of this Board for 1888.

The information contained in the above-mentioned blanks when filled and returned to this office by the health officers of localities where dangerous communicable diseases have existed, together with other correspondence in regard to outbreaks of such diseases, are the bases on which the various statements made in this article are founded.

The increasingly large number of replies received in answer to communications in regard to contagious diseases, the general desire manifested by health officers for documents on the restriction of communicable diseases, and the general care taken to send complete reports to this office, show an increasing interest among the people, and a commendable effort on the

* It is believed that these documents distributed in this manner are doing great good; for the neighbors of the sick are sufficiently alarmed to read the documents, and are thus led to co-operate in stamping out the disease.

Some evidence of the value of this work may be seen further on in this article, under the heads of "Estimated Numbers of Outbreaks and Cases of Diphtheria Prevented and Lives Saved by Isolation and Disinfection," and "Practical Results in Restricting Scarlet Fever."

part of the local health authorities to have every means employed to prevent the spread of communicable diseases. The number of communications which annually pass to and from this office relative to dangerous communicable diseases, has increased nearly one hundred per cent during the last three years.

TABLE 1.—*Weekly Number of Places in Michigan at which each of the five Communicable Diseases, Diphtheria, Scarlet Fever, Typhoid Fever, Measles and Small-pox, were Reported Present During 1891.*

Weeks ending:—		Diphtheria.	Scarlet Fever.	Typhoid Fever.	Measles.	Small-pox.
January	3	28	35	14	16	0
	10	30	42	19	32	0
	17	33	55	21	31	0
	24	35	47	12	21	0
	31	43	45	17	32	0
February	7	35	44	12	28	0
	14	32	38	14	29	0
	21	28	46	19	32	0
	28	29	46	15	35	0
March	7	24	41	13	38	0
	14	22	38	20	47	0
	21	16	35	7	51	0
	28	14	36	7	52	0
April	4	20	31	3	38	0
	11	11	32	4	36	0
	18	14	32	4	39	0
	25	18	32	9	45	0
May	2	25	33	5	52	0
	9	19	31	6	47	0
	16	17	28	10	46	0
	23	22	30	6	43	0
	30	21	25	7	37	0
June	6	22	24	7	32	0
	13	19	31	12	35	0
	20	30	34	11	43	0
	27	25	39	14	34	0
July	4	26	35	14	20	0
	11	31	35	15	27	0
	18	28	36	16	21	0
	25	22	27	22	15	0
August	1	24	27	18	10	0
	8	24	33	21	12	0
	15	27	33	25	10	1
	22	34	44	33	11	0
	29	38	37	40	12	0
September	5	32	35	56	11	0
	12	32	32	56	8	1
	19	33	27	68	9	2
	26	31	31	62	4	2
October	3	42	32	60	5	2
	10	35	32	48	5	1
	17	34	35	47	4	0
	24	41	41	81	3	0
	31	41	37	94	3	0
November	7	36	39	78	4	0
	14	42	40	57	9	0
	21	39	36	57	3	0
	28	43	36	39	7	0
December	5	47	41	41	6	0
	12	43	53	41	9	0
	19	45	41	33	10	0
	26	46	42	23	5	0
Average number of places per week		29.77	36.29	27.75	23.35	0.17

TABLE 2.—*Exhibiting, in regard to Diphtheria and Scarlet Fever in Michigan, for the six years, and for each of the six years, 1886-1891, and regarding Measles for the two years, and for each of the two years, 1890-91, and Typhoid Fever for the year 1890, the Average Number of Cases and Deaths per Outbreak when Isolation and Disinfection were Enforced, and the same when those Precautionary Measures were Neglected.*

Year.	Scarlet Fever.				Diphtheria.				Measles.				Typhoid Fever.			
	Isolation and Disinfection Neglected.*		Isolation and Disinfection Enforced.		Isolation and Disinfection Neglected.		Isolation and Disinfection Enforced.		Isolation and Disinfection Neglected.		Isolation and Disinfection Enforced.		Isolation and Disinfection Neglected.		Isolation and Disinfection Enforced.†	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
1886	13.84	1.02	2.74	0.19	16.18	3.23	2.86	0.66								
1887	11.87	0.82	2.31	0.17	11.79	2.71	2.54	0.65								
1888	11.87	0.54	2.22	0.08	15.50	2.38	1.74	0.53								
1889	16.78	0.67	2.69	0.19	11.66	2.63	1.56	0.22								
1890	12.10	0.38	1.81	0.02	12.70	2.38	1.52	0.33	84.54	0.77	3.16	0.00	6.58	0.96	1.97	0.32
1891	12.09	0.47	2.55	0.02	11.95	2.46	2.24	0.49	83.38	0.59	2.45	0.00				
Av. for six years, 1886-91	13.09	0.65	2.39	0 11	13.30	2.63	2.08	0.48	83.96	0.83	2.81	0.00				

* In this double column, the average numbers of cases and deaths given for the years 1886 and 1887, are for all outbreaks in which isolation *or* disinfection *or* both were neglected. In the other four years, 1888-1891, they are, as stated,—for those outbreaks in which isolation and disinfection were both neglected.

† Includes disinfection of the discharges from the bowels.

DIPHTHERIA IN MICHIGAN.—YEAR ENDING DECEMBER 31, 1891.

During the year ending December 31, 1891, there were reported to the Secretary of the State Board of Health 535 outbreaks of diphtheria in 461 localities in Michigan, which resulted in 4,385 cases and 1,002 deaths. Notwithstanding the marked improvement which the State Board of Health has succeeded in bringing about both in promptness and accuracy of reports of local health officials to the central office, it is still evident that not all cases of and deaths from diphtheria are yet reported. For the year 1891 there were reported to the Secretary of State 1,060 deaths from diphtheria, or 58 more than were reported to this office; and the Secretary of the State Board of Health estimates that the deaths reported to the Secretary of State should be increased by about 40 per cent to equal the actual number of deaths which occur; and according to this estimate, there were about 1,484 deaths from diphtheria during 1891, in Michigan, instead of 1,002, as reported to the State Board of Health.

DISTRIBUTION OF DIPHTHERIA IN 1891.

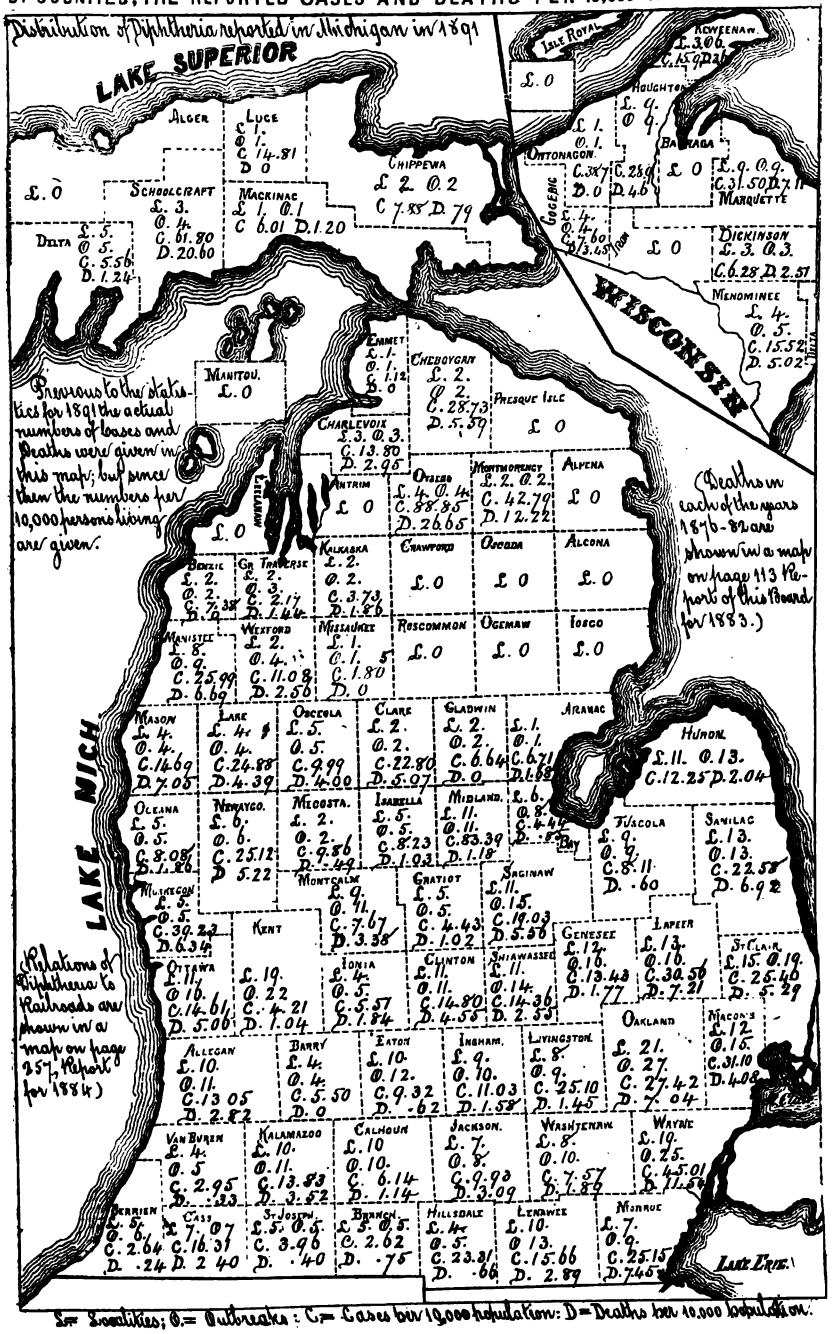
Table 1 and the map on pages 149 and 150 exhibit, in slightly different ways, by counties, the distribution of the reported diphtheria in Michigan, during the year 1891. The 15 counties from which were reported the greatest number of cases of diphtheria per 10,000 persons living were, in the order of the greatest number of cases, as follows: Otsego, 88.85; Midland, 83.39; Schoolcraft, 61.80; Wayne, 45.01; Montmorency, 42.79; Muskegon, 39.23; Ontonagon, 38.71; Marquette, 31.50; Macomb, 31.10; Lapeer, 30.56; Houghton, 28.90; Cheboygan, 28.73; Oakland, 27.42; Manistee, 25.99; St. Clair, 25.40. From the following 15 counties no cases of diphtheria were reported for the year 1891: Alcona, Alger, Alpena, Antrim, Baraga, Crawford, Iosco, Iron, Isle Royal, Leelanaw, Manitou, Ogemaw, Oscoda, Presque Isle, Roscommon. For the whole State the number of cases reported was 20.49 per 10,000 persons living.

DIPHTHERIA IN 1891, COMPARED WITH PREVIOUS YEARS.

Comparisons with previous years, to ascertain the comparative increase or decrease of prevalence of this disease in the State, would no doubt be interesting and instructive if there existed a fixed basis on which to found such comparisons; but from year to year there has been a steady improvement, both in the methods adopted by the State Board of Health in securing and compiling reports; and in the efforts made by local health authorities throughout the State to furnish in their reports the information desired by the State Board. It is therefore still impossible to determine the exact increase or decrease of prevalence of the disease in the State by comparison of the numbers of outbreaks of the disease, and the cases and deaths resulting therefrom, reported to this office year by year; and this fact should be borne in mind in referring to Table 2.

DISTRIBUTION OF DIPHTHERIA IN MICHIGAN IN 1891.

BY COUNTIES, THE REPORTED CASES AND DEATHS PER 10,000 INHABITANTS.



L= Localities; O.= Outbreaks; C= Cases per 10,000 population; D= Deaths per 10,000 population.

TABLE 1.—*Numbers of Cases and Deaths reported from Diphtheria per 10,000 persons living in each County in Michigan during the year 1891. (Compiled from reports of Health Officers, Clerks, etc.)*

Counties.	Estimated* population of Michigan for 1891.	Number of reported		Number, per 10,000 population, of		Counties.	Estimated* population of Michigan for 1891.	Number of reported		Number, per 10,000 population, of	
		Cases.	Deaths.	Cases.	Deaths.			Cases.	Deaths.	Cases.	Deaths.
State	2,139,584	4,385	1,002	20.49	4.68	Keweenaw	2,757	44	10	15.96	3.63
						Lake	6,832	17	3	24.88	4.39
Alcona	5,689	0	0	.00	.00	Lapeer	29,120	89	21	30.56	7.21
Alger	1,293	0	0	.00	.00	Leelanaw	8,113	0	0	.00	.00
Allegan	39,076	51	11	13.05	2.82	Lenawee	48,459	76	14	15.66	2.89
Alpena	16,260	0	0	.00	.00	Livingston	20,719	52	3	25.10	1.45
Antrim	10,981	0	0	.00	.00	Luce	2,701	4	0	14.81	.00
Arenac	5,958	4	1	6.71	1.68	Mackinac	8,323	5	1	6.01	1.20
Baraga	3,159	0	0	.00	.00	Macomb	31,832	99	13	31.10	4.08
Barry	23,630	13	0	5.50	.00	Manistee	25,400	66	17	25.99	6.69
Bay	58,588	26	5	4.44	.85	Manitou	813	0	0	.00	.00
Benzie	5,417	4	0	7.38	.00	Marquette	39,363	124	28	31.50	7.11
Berrien	41,735	11	1	2.64	.24	Mason	17,017	25	12	14.69	7.05
Branch	26,676	7	2	2.62	.75	Mecosta	20,269	2	1	9.86	.49
Calhoun	44,006	27	5	6.14	1.14	Menominee	21,894	23	11	15.52	5.02
Cass	20,848	34	5	16.31	2.40	Midland	11,033	92	13	83.39	1.18
Charlevoix	10,143	14	3	13.80	2.95	Missaukee	5,398	1	0	1.85	.00
Cheboygan	12,532	36	7	28.73	5.59	Monroe	32,209	81	24	25.15	7.45
Chippewa	12,696	10	1	7.88	.79	Montcalm	32,586	25	11	7.67	3.38
Clare	7,895	18	4	22.80	5.07	Montmorency	1,636	7	2	42.79	12.22
Clinton	26,350	39	12	14.80	4.55	Muskegon	41,356	174	28	39.23	6.34
Crawford	3,142	0	0	.00	.00	Newaygo	21,055	53	11	25.12	5.22
Delta	16,182	9	2	5.56	1.24	Oakland	41,216	113	29	27.42	7.04
Dickinson	15,986	10	4	6.28	2.51	Oceana	16,098	13	3	8.08	1.86
Eaton	32,181	30	2	9.32	.62	Ogemaw	5,953	0	0	.00	.00
Emmet	8,968	1	0	1.12	.00	Ontonagon	3,875	15	0	38.71	.00
Genesee	39,451	53	7	13.43	1.77	Osceola	15,015	15	6	9.99	4.00
Gladwin	4,516	3	0	6.64	.00	Oscoda	2,048	0	0	.00	.00
Gogebic	14,483	11	5	7.60	3.45	Otsego	4,502	40	12	88.85	26.65
Gd. Traverse	13,848	3	2	2.17	1.44	Ottawa	35,581	52	18	14.61	5.06
Gratiot	29,341	13	3	4.43	1.02	Presque Isle	4,844	0	0	.00	.00
Hillsdale	30,454	71	2	23.31	.66	Roscommon	2,090	0	0	.00	.00
Houghton	36,681	106	17	28.90	4.63	Saginaw	84,591	161	47	19.03	5.56
Huron	29,391	36	6	12.25	2.04	Sanilac	33,214	75	23	22.58	6.92
Ingham	38,065	42	6	11.03	1.58	Schoolcraft	6,311	39	13	61.80	20.60
Ionia	32,694	18	6	5.51	1.84	Shiawassee	31,341	45	8	14.36	2.55
Iosco	16,059	0	0	.00	.00	St. Clair	52,696	144	30	25.40	5.29
Iron	4,490	0	0	.00	.00	St. Joseph	25,229	10	1	3.96	.40
Isabella	19,447	16	2	8.23	1.03	Tuscola	33,185	27	2	8.11	.60
Isle Royal	143	0	0	.00	.00	Van Buren	30,515	9	1	2.95	.33
Jackson	45,331	45	14	9.93	3.09	Washtenaw	42,246	32	8	7.57	1.89
Kalamazoo	39,766	55	14	13.83	3.52	Wayne	266,181	1,205	307	45.01	11.54
Kalkaska	5,382	2	1	3.73	1.86	Wexford	11,724	13	3	11.08	2.56
Kent	113,589	478	118	4.21	1.04						

* By Dr. C. L. Wilbur, Chief of Vital Statistics in Michigan "State Department."

TABLE 2.—DIPHTHERIA IN MICHIGAN: *Numbers of Reported Outbreaks, Localities (in which they Occurred), Reported Cases and Deaths, Average Numbers of Cases and Deaths per Outbreak, and the Per Cent of Cases which proved fatal, as reported for each of the Ten Years, 1882-91; also Averages of the same for the Seven Years, 1884-90, and Comparisons of the Facts for 1891 with those for 1890 and with the Averages for the Seven Years, 1884-90.*

Year.	Reported Outbreaks.	Reported Localities.	Reported Cases.	Average Cases per Outbreak.	Reported Deaths.	Average Deaths per Outbreak.	Deaths per 100 Cases.
1882	----------	163	2,046	----------	495	----------	24.
1883*	----------	125	2,246	----------	543	----------	24.
1884†	362	302	3,915	10.8	905	2.5	23.
1885	467	396	4,018	8.6	964	2.	24.
1886	550	422	4,244	7.7	982	1.8	23.
1887	466	371	3,382	7.3	825	1.8	24.4
1888	337	283	2,228	6.6	532	1.6	23.9
1889	398	329	3,157	7.9	683	1.7	21.6
1890	442	365	4,206	9.5	1,050	2.4	25.
1891	535	461	4,385	8.2	1,002	1.9	22.8
Average for seven years, 1884-1890	432	353	3,593	8.3	849	2.0	23.6
Variations in 1891 from 1890	+93	+96	+179	−1.3	−48	−0.5	−2.2
Variations in 1891 from the average for seven years, 1884-90	+103	+108	+792	−0.1	−153	−0.1	−0.8

* The use of the blank form "M" for weekly reports was begun May, 1883.
† In compiling diphtheria the use of the annual reports of health officers was begun in 1884.

The following table and diagram (No. 3) giving the number of deaths from diphtheria, per 100,000 persons living, reported to the Secretary of State, probably quite accurately represents the annual fluctuations of, but not the total deaths from diphtheria in Michigan during the 25 years, 1868-92.

TABLE 3.—*Exhibiting the reported number of deaths from Diphtheria per 100,000 persons living in Michigan in each of the 24 years, 1868-91. Compiled from the Secretary of State's Vital Statistics of Michigan. (Population estimated by average annual increase, by Dr. Wilbur, Chief of Vital Statistics in State Department.)*

Year.	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.
Deaths	8.84	7.80	10.22	10.49	15.06	16.44	15.60	14.68	21.36	39.51	59.36	92.55
Year.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.
Deaths	94.20	122.61	81.93	56.76	58.53	56.50	58.45	47.78	35.51	41.49	60.46	49.54

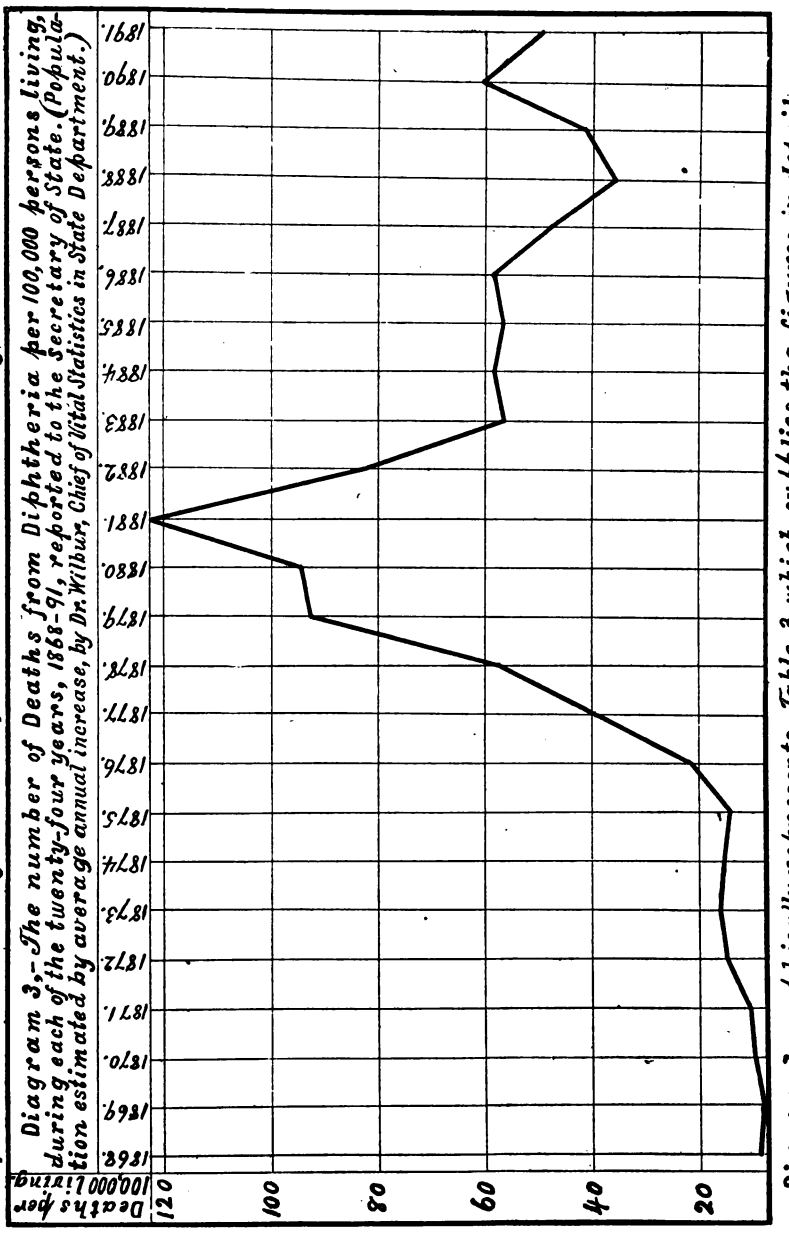


Diagram 3, graphically represents Table 3 which supplies the figures in detail.

NUMBER OF OUTBREAKS OF DIPHTHERIA IN EACH MONTH OF THE YEAR, 1891.

TABLE 4.—*Exhibiting the reported number of outbreaks of Diphtheria which Began, the number which Ended, and the number of outbreaks which were Present, in each Month of the Year 1891, in the different local jurisdictions of Michigan.*

Outbreaks reported in different localities.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Number began	73	35	33	35	27	34	35	43	41	50	52	42	500
Number ended	33	37	37	18	21	25	29	30	42	48	43	71	434
Number present	86	90	79	67	72	82	91	107	111	113	108	106	-----

The last line of figures, representing the reported number of outbreaks present, is not derived from the preceding two lines, as might be supposed, but is obtained by actual count of the number of outbreaks reported as existing in each month. Frequently the beginning of an outbreak is reported but the end of the outbreak is not reported; and sometimes the month in which the outbreak ended is given without giving the date of the beginning of the outbreak. In either case the outbreak may have begun and ended in the same month, or it may have extended through several months. There were 66 more beginnings than endings of outbreaks reported during the year 1891.

SOURCE OF CONTAGIUM OF DIPHTHERIA, HOW THE DISEASE IS SPREAD, AND THE VITALITY OF THE CONTAGIUM, ETC.

Of the 4,385 cases of diphtheria reported, during the year 1891, as exhibited in the following table, the local health officers reported the source of contagium as follows:—Traced to a former case, 779; probably traced to a former case, 52; possibly traced to a former case, 32; attributed to meteorological conditions, 9; attributed to unsanitary conditions, 306; unknown, 915; not reported or indefinitely reported, 2,292; total, 4,385.

TABLE 5.—*Reported Source of Contagium of Diphtheria in 1894.*

Cases reported as traced to a former case	779
Cases reported as probably traced to a former case	52
Cases reported as possibly traced to a former case	32
Cases attributed to meteorological conditions	9
Cases attributed to unsanitary conditions	306
Cases the source of contagium of which was reported as unknown (includes those reported "Sporadic," "Spontaneous," "De Novo," etc.)	915
Cases the sources of contagium of which were not reported, or the statements were too indefinite for classification	2,292
All cases	4,385

Outbreaks Traced to a Former Case.

The following are extracts from the reports of some of the health officers who were able to trace the outbreaks of diphtheria in their respective jurisdictions to cases of the disease outside their jurisdictions,—with the name of the health officer, and of the jurisdiction, subjoined:—

The first case, "exposed to the disease at Grand Rapids."—*Amos J. Cook, Leighton township, Allegan county.*

"Brought by visitors from the township of Hopkins, Allegan county."—*M. A. Powell, Monterey township, Allegan county.*

"This was from contagion,—caught by a little girl, S——, from a patient just recovering in Johnston."—*George R. Hyde, M. D., Prairieville township, Barry county.*

"Two children were brought from Monroe county who had just recovered from an attack."—*Edward Gallery, Eaton township, Eaton county.*

"From the attending physician."—*Byron S. Jennings, Vienna township, Genesee county.*

"This is a mild case contracted from a case that died in Fife Lake township February 22."—*Lewis S. Walter, M. D., Fife Lake.*

"Was brought from Merrill, Saginaw county."—*A. P. Lane, Clerk, Ithaca.*

"A young girl, who had a brother die of diphtheria, came from Calumet and remained in the neighborhood about two weeks."—*Alfred David, M. D., Adams township, Houghton county.*

"It was introduced into this township by a boy entering a house in (Nelson Centre) Kent county where the diphtheria was at the time."—*John Kinney, Ensley township, Newaygo county.*

"By cleaning house and airing things not previously renovated where they had had it before."—*Charles H. Richmond, Clerk, Waterford township, Oakland county.*

"Direct exposure from an older female who had contracted the disease in the city of Grand Rapids."—*Wm. E. Vischer, M. D., Allendale township, Ottawa county.*

"Number one was imported from Grand Rapids."—*Henry Kremers, M. D., Holland.*

"Supposed to have been from Detroit by members of at least two families affected; came home on a visit and inquiry showed they had come from houses where the disease had been lately."—*Alexander Stephens, M. D., Delaware township, Sanilac county.*

"Brought from Port Huron."—*John W. Fead, Clerk of the Board of Health, Lexington village, Sanilac county.*

"Patient went to visit relatives and afterwards it was determined that some of them were suffering from symptoms of the disease in a mild form, came home and in a few days came down with it."—*W. C. Brownell, M. D., Byron.*

"The disease was brought into my family by the health officer of the township of Burns."—*James W. Goodfellow, Venice township, Shiawassee county.*

"It was brought into this town by persons from Macomb township attending a wedding in the German part of the township."—*George B. Court, Ray township, Macomb county.*

"A boy came from Detroit from where they had had the disease; then the family where it started sent off some of their children and spread it."—*J. C. Flynn, M. D., Warren township, Macomb county.*

"An uncle of the child was working at Arcadia where they had diphtheria, came home on the 16th and held the child during the day."—*C. A. Norconk, M. D., Bear Lake township, Manistee county.*

"Carried from the city of Ishpeming into this township."—*John McGaffick, Ely township, Marquette county.*

"It was brought from Saginaw."—*W. Warren, M. D., Edenville township, Midland county.*

"Coming in contact with other children coming down with diphtheria at Sanford, Jerome township, Midland county."—*Joseph Morrison, Geneva township, Midland county.*

"From nursing family (living in Ohio) sick with same disease."—*Arthur O. Kinney, Bedford township, Monroe county.*

"From associating with Ohio people that were coming down with it."—*Arthur O. Kinney, Bedford township, Monroe county.*

"Exposure at Ypsilanti."—*L. Baldwin, M. D., Exeter township, Monroe county.*

"Mrs. C—'s people visiting at Howard City at house of outbreak and at the time of outbreak."—*G. S. Townsend, M. D., Belvidere township, Montcalm county.*

"Infection by visitor from Detroit."—*Charles Doran, Lincoln township, Huron county.*

"A little boy on Division street [Lansing] . . died [of diphtheria] Monday the 20th of April. . . Mrs. D—— saw the child the day it died, and she came down here (Mason) the next day." "Was taken sick the 23rd day of April."—*George H. Ferguson, M. D., Mason.*

"Exposure from cases in the city of Grand Rapids."—*Henry H. Havens, Grand Rapids township, Kent county.*

"Brought from Grand Rapids."—*Wm. H. Hyser, M. D., Plainfield township, Kent county.*

"Brought by a small child visiting from Lake Linden."—*John McRay, M. D., Sherman township, Keweenaw county.*

"It was introduced by patient with the disease coming here from Port Huron."—*David V. Yerix, M. D., Imlay City.*

"By the patient coming from Lapeer on the train the fifth day of the disease."—*Norman M. Stark, Otter Lake.*

"Contagium was imported from Detroit. A little girl came from Detroit to attend the marriage of a friend, and had not entirely recovered from the disease."—*Alexander Gunn, M. D., Lenox township, Macomb county.*

"Brought by visitors from Detroit."—*Carl Juengel, Macomb township, Macomb county.*

"The father of the deceased went to Cheboygan, Michigan, while diphtheria was prevailing there and on his return his children were taken down with it."—*Bruno LeClerc, Clerk of the Board of Health, Garfield township, Mackinac county.*

"She visited her parents in the township of Imlay, Lapeer county. Diphtheria was prevailing in the nearest house to that of her parents."—*Duncan Paterson, M. D., Mussey township, St. Clair county.*

"The lady says she caught the disease at Ann Arbor."—*D. A. Post, M. D., Ypsilanti.*

"The boy called to see a brother, in Detroit, who was sick with the disease a week previous to the attack in this case."—*Thomas H. Mathews, M. D., Redford township, Wayne county.*

"Brought in infected clothing from the city of Greenville, Montcalm county, Michigan; so stated by head of family."—*J. A. Barry, M. D., Boon township, Wexford county.*

Outbreaks Traced to Cases of "Sore Throat."

The following reports of health officers show how diphtheria is frequently spread under that fear-allaying title, "sore throat":—

"By a nurse woman having malignant sore throat, and attending a lying-in case where there were small children."—*Frank W. LeFever, M. D., Charlevoix.*

"Supposed to be from exposure to a case of sore throat visited in the village of Fenton two weeks before."—*H. H. Chase, M. D., Linden.*

"The sister of Mrs. A—— was sick about two weeks before Mrs. A—— was taken. She had a sore throat but they did not call a doctor, but called it tonsillitis, and Mrs. A—— went there and took care of her."—*Henry B. Pearce, Charleston township, Kalamazoo county.*

"A case having very slight sore throat having come from Grand Rapids to visit family."—*E. B. Strong, M. D., Byron township, Kent county.*

"In the first case, that of Nellie N——, her brother came home from Wisconsin, and had what was supposed to be ordinary sore throat. In about one week Nellie N—— was taken sick with diphtheria. The brother probably had the same disease."—*W. S. Morden, M. D., Macon township, Lenawee county.*

"Supposed to have been brought from Detroit by a young man who had had sore throat."—*H. F. Sigler, M. D., Pinckney.*

"By visiting relatives in adjoining township where child was sick with sore throat, and the attending physician called it canker."—*J. C. Flynn, M. D., Warren township, Macomb county.*

"Supposed to be from a family sick with sore throat; the attending physician evidently blundered as one has since died of paralysis of the throat."—*Henry K. Lathrop, M. D., Royal Oak.*

"By common sore throat not thought to be dangerous."—*James Gibbs, Benona township, Oceana county.*

"On Monday, three weeks ago, a young man by the name of P—— came home from Detroit sick with sore throat which was pronounced quinsy until he died one week after, and the second case, his sister, came down."—*Herbert E. Foster, Wayne.*

"Came by chance or was sore throat."—*Wm. B. Stockwell, White Lake township, Oakland county.*

"There is an outbreak of diphtheria here, in the household of Mr. M——. Mr. M—— went to Seaforth, Ontario, on the 30th November to attend his father's funeral, taking his son John, about 15 years old, along with him. At an aunt's there were some young people suffering with what Dr. Bethune called "quinsy." John M—— stayed a couple of nights at this aunt's. Friday A. M., Dec. 4, he was taken sick; arrived home that evening. I saw him next day. Isolated the boy too late. Three others of the family have it."—*George W. Chrouch, M. D., Woodhull township, Shiawassee county.*

TABLE 6.—*First, second and third localities, where the second locality was infected with diphtheria from the first, and the third was infected from the second; and the numbers of cases and deaths from diphtheria in the first, second and third localities. (Compiled from reports of health officers who were able to trace the source of contagium to other localities.)*

Primary Localities from which Diphtheria Spread.	In First Locality.		Secondary Localities infected from Primary.	In Second Locality.		Tertiary Localities infected from Secondary.	In Third Locality.	
	Cases.	Deaths.		Cases.	Deaths.		Cases.	Deaths.
Allegan county: Grange township	*		Allegan county: Clyde township	4	0			
Allegan county: Hopkins township	*		Allegan county: Monteray township	21	5			
Barry county: Johnston township	1	0	Barry county: Prairieville township	8	0			
Bay county: Bay City	17	3	Montcalm county: Day township	1	0			
Benzie county: Benzonia village	*		Manistee county: Onekama village	1	0			
Benzie county: Frankfort village	2	0	Manistee county: Pleasanton township	28	2	Manistee county: Onekama village	1	0
Charlevoix county: Charlevoix village	12	2	Emmet county: Bear Creek township	1	0			
Cheboygan county: Cheboygan city	35	7	Mackinac county: Garfield township	5	1			
Clare county: Surrey township	*		Kent county: Cedar Springs village	3	1			
Clinton county: Elsie village	3	0	Clinton county: Greenbush township	5	0			
Genesee county: Fenton village	*		Genesee county: Linden village	1	0			
Genesee county: Flint township	*		Genesee county: Clayton township	2	0			
Grand Traverse county: Fife Lake township	1	0	Grand Traverse county: Fife Lake village	1	0			
Houghton county: Calumet village	4	0	Houghton county: Adams township	3	0			
Houghton county: Lake Linden village	9	0	Keweenaw county: Sherman township	38	7			
Ingham county: Lansing city	19	4	Ingham county: Mason city	1	0			
Ingham county: Meridian township	5	0	Oakland county: Milford village	3	1			
Kalamazoo county: Kalamazoo city	29	8	Montcalm county: Howard City village	7	3	Montcalm county: Belvidere township	1	1

* This outbreak was not reported to this office by the Health Officer of the "first" locality at the time it occurred.

TABLE 6.—CONTINUED.

Primary Localities from which Diphtheria Spread.	In First Locality.		Secondary Localities infected from Primary.	In Second Locality.		Tertiary Localities infected from Secondary.	In Third Locality.	
	Cases.	Deaths.		Cases.	Deaths.		Cases.	Deaths.
Kent county: Grand Rapids city	371	93	Allegan county: Dorr township	4	2			
			Leighton township	5	0			
			Ionia county: Ionia city	4	2			
			Kent county: Byron township	10	1			
			Cedar Springs village	6	4			
			Grand Rapids township	5	2			
			Plainfield township	3	0			
			Montcalm county: Greenville city	2	1	Wexford county: Boon township	8	1
			Ottawa county: Allendale township	6	2			
			Blendon township	5	2			
			Holland city	3	1			
			Olive township	1	0			
Kent county: Courtland township	*	----	Kent county: Algoma township	3	1			
Kent county: Nelson township	2	0	Newaygo county: Ensley township	13	4			
Lapeer county: Lapeer city	5	2	Lapeer county: Dryden township	1	0			
			Otter Lake village	1	1			
Livingston county: Genoa township	11	1	Livingston county: Brighton township	5	0			
Macomb county: Memphis village	*	----	St. Clair county: Columbus township	3	1			
Manistee county: Arcadia township	5	2	Benzie county: Blaine township	2	0			
			Manistee county: Bear Lake township	1	0			
Marquette county: Ishpeming city	50	10	Marquette county: Ely township	6	3			
Midland county: Jerome township	4	0	Midland county: Geneva township	6	3			
Monroe county	*	----	Eaton county: Eaton township	6	2			
Muskegon county: Muskegon city	148	21	Ottawa county: Wright township	3	0			
Oakland county: Highland township	15	3	Oakland county: Rose township	3	1			
Oakland county: Birmingham village	*	----	Oakland county: Troy township	2	0			
Oakland county: Royal Oak village	8	2	Oakland county: Royal Oak township	7	3			
Saginaw county: Saginaw city	69	12	Midland county: Edenville township	60	8	Gladwin county: Gladwin village	1	0
Saginaw county: Merrill village	*	----	Gratiot county: Ithaca village	3	2			
Saginaw	*	----	Tuscola county: Vassar township	1	1			

* This outbreak was not reported to this office by the Health Officer of the "first" locality at the time it occurred.

TABLE 6.—CONTINUED.

Primary Localities from which Diphtheria Spread.	In First Locality.		Secondary Localities infected from Primary.	In Second Locality.		Tertiary Localities infected from Secondary.	In Third Locality.	
	Cases.	Deaths.		Cases.	Deaths.		Cases.	Deaths.
Shiawassee county:			Shiawassee county:					
Burns township	2	0	Venice township	4	3			
			Lapeer county:			Lapeer county:		
			Imlay City village	15	3	Almont township	4	1
						Imlay township†	21	7
St. Clair county:								
Port Huron city	51	12	Sanilac county:			Sanilac county:		
			Lexington village	1	1	Lexington township	1	0
			St. Clair county:			St. Clair county:		
			Kimbal township	12	2	Wales township	5	0
			Saginaw county:					
Tuscola county	*	----	Frankenmuth township	18	8			
			Livingston county:					
			Brighton village	2	0			
Washtenaw county:								
Ann Arbor city	10	5	Washtenaw county:					
			Webster township	1	0			
			Ypsilanti City	3	0			
Washtenaw county:								
Milan village	*	----	Monroe county:					
			Milan township	1	1			
			Huron county:					
			Lincoln township	1	0			
			Lenawee county:					
			Hudson village	3	1			
			Livingston county:					
			Pinckney village	20	1			
			Putnam township	30	1			
			Macomb county:					
			Lenox township	25	0			
			Macomb township	5	2			
			Warren township	32	2			
			Oakland county:					
			Bloomfield township	6	3			
			Pontiac city	1	0			
			Pontiac city	2	1			
			Pontiac city	3	1			
Wayne county:								
Detroit city	1082	252	Pontiac city	1	0			
			Osceola county:					
			Evart village	1	0			
			Sanilac county:					
			Delaware township	8	1			
			Shiawassee county:					
			Owosso city	11	2			
			St. Clair county:					
			Columbus township	2	1			
			Washtenaw county:			Monroe county:		
			Ypsilanti city	10	1	Exeter township	6	1
			Wayne county:					
			Grosse Point village	1	0			
			Bedford township	1	0			
			Wayne village	5	1			
(*Outside the State.*)								
			Newaygo county:					
			Barton township	4	1			
Canada	----	----						
			Shiawassee county:					
			Woodhull township	5	0			

* This outbreak was not reported to this office by the Health Officer of the "first" locality at the time it occurred.

† From Imlay township to St. Clair county, Mussy township, nine cases and two deaths.

TABLE 6.—CONTINUED.

Primary Localities from which Diphtheria Spread.	In First Locality.		Secondary Localities infected from Primary.	In Second Locality.		Tertiary Localities infected from Secondary.	In Third Locality.	
	Cases.	Deaths.		Cases.	Deaths.		Cases.	Deaths.
Chicago	----	----	Berrien county: Benton Harbor city	1	0			
			Wayne county: Wayne village	5	1	Wayne county: Nankin township	2	0
Dakota	----	----	Washtenaw county: Saline township	2	1			
Indiana	----	----	Cass county: Mason township	1	0			
			Kalamazoo county: Climax township	7	0			
Sioux City, Iowa	----	----	Calhoun county: Newton township	3	1			
Ohio	----	----	Monroe county: Bedford township	8	3			
Wisconsin	----	----	Calhoun county: Albion township	2	1			

Outbreaks of Diphtheria Attributed to Unsanitary Conditions.

The following are some representative statements of health officers (or clerks) who attributed outbreaks of diphtheria in their jurisdictions to unsanitary conditions, with the name of the health officer and of his jurisdiction subjoined.

"Generated on premises where first case appeared; fowls had been quartered under the living rooms for years."—*John F. Berringer, M. D., Watervliet township, Berrien county.*

"Unaccountable unless traceable to the low water and decaying vegetation in and along the banks of the Looking-Glass river."—*P. W. Pearsall, M. D., Watertown township, Clinton county.*

"The only source that I could make out was filth all over premises."—*E. Meyers, M. D., Iron Mountain.*

"Decayed vegetation in cellar."—*Z. W. Waldron, M. D., Jackson.*

"People living in a barn; low, damp ground; no other cause known."—*Samuel White, Walker township, Kent county.*

"Impure water."—*Samuel McKillen, Goodland township, Lapeer county.*

"Due to filth. The well is located in the centre of a triangle formed by hog pen, barn yard and privy, not more than 30 feet from any of them, with no drainage, family very filthy."—*John C. Iffland, Riga township, Lenawee county.*

"From stagnant water opposite the house."—*John M. How, Jerome township, Midland county.*

"From swamps and standing water."—*Daniel Shannon, Norwich township, Newaygo county.*

"Principally uncleanliness."—*George H. Osborne, Clerk, Bagley township, Otsego county.*

"Swimming in stagnant water."—*John W. Norrington, Polkton township, Ottawa county.*

"Bad sanitary arrangements."—*Dr. Eugene H. Hillyer, Jonesfield township, Saginaw county.*

"Bad sanitary condition of house."—*James Lister, M. D., Maple Valley township, Sanilac county.*

"From effects of damp dwellings."—*Thomas F. Rodwell, M. D., Carrollton.*

"Nearly all cases took place in German families. In my opinion filth was the cause."—*John S. Little, M. D., Moor township, Sanilac county.*

"Drying up of road near residence and emptying of a mill race in the vicinity."—*L. H. D. Pierce, M. D., Nottawa township, St. Joseph county.*

"Probably from bad water; their lot was low; a ditch run through it near house; privy stood over ditch or nearly so; well perhaps 20 or 25 feet off; no cellar to house; no other cause known."—*Henry K. Lathrop, M. D., Royal Oak.*

"A cellar under the house built nine years ago, no ventilation, walls very moldy."—*Dr. W. F. Stringham, Shelby township, Oceana county.*

"Bad drainage."—*George N. Tibbitts, Clerk, Interior township, Ontonagon county.*

"Bad drainage for all."—*James Cahalan, M. D., Wyandotte.*

Outbreaks Attributed to Meterological Conditions.

"Changeable weather."—*Henry Kelly, Brookfield township, Huron county.*

"Supposed to be from exposure to cold."—*J. M. Loope, M. D., Port Sanilac.*

"Inclement weather."—*George W. Spalsbury, Leonidas township, St. Joseph county.*

"Catching cold from home to school."—*Peter Nelson, Bark River township, Delta county.*

"Colds."—*L. H. Woodworth, Blackman township, Jackson county.*

"Exposure to wet."—*C. L. Finch, M. D., Chassell township, Houghton county.*

NEGLECT OF MEASURES TO RESTRICT DIPHTHERIA, VIOLATIONS OF PUBLIC HEALTH LAWS, ETC.,—RESULTS.

Concerning an outbreak of diphtheria, November 13, in Monterey township, Allegan county, the health officer, Myron A. Powell, states that "four died before had health officer appointed," and that there were "no restrictions till Nov. 20, 1891." There were reported to have occurred in this outbreak 23 cases and five deaths.

Relative to an outbreak of diphtheria, August 10, in Hatton township, Clare county, in which 15 cases and four deaths were reported to have occurred, P. E. Witherspoon, health officer of Hayes township, Clare county, in a letter of August 24, reported as follows: "I was called to W. C. Nowlen's family Friday, August 21, 1891, and found six children suffering with diphtheria, and there has been no separation from the neighbors, and they are exposing the whole place, Hatton, to the effects. This, Monday, eve there have two children died. I have notified the supervisor and clerk,—there is no health officer in the township of Hatton."

In his final report of the outbreak of diphtheria in Edenville township, Midland county, the health officer, Dr. W. Warren, replying to the question, "Which of the patients were kept isolated from all other persons

except the nurse and physician," said: "There were only a few kept isolated. From the first I could not control the people." To the question as to the amount of sulphur burned in disinfecting, he replied: "I do not know." To the question, "What exceptions were there to the complete accomplishment of the foregoing measures of isolation and disinfection," he replied: "There were too many to mention." As a result of this culpable laxness towards this exceedingly dangerous communicable disease there were reported to have occurred in this outbreak 60 cases and eight deaths.

Relative to the measures of restriction in an outbreak in Byron township, Kent county, the health officer, Edwin B. Strong, in response to the question, "Which of the patients were kept isolated from all other persons except nurse and physician," replied: "None; house too small for isolation." To the question, "What exceptions were there to the complete accomplishment of the foregoing measures of isolation and disinfection," he responded: "Fumigations, etc., were imperfect on account of dwellings being all very small and rickety;" and also that "Two children escaped." In this outbreak there were reported to have occurred 25 cases and six deaths.

Concerning the difficulties met in attempting to enforce restrictive measures in the outbreak of diphtheria, which began May 27, in the township of Michigamme, Marquette county, the health officer, Dr. I. R. Humphrey, reported as follows: "I could not confine members of the afflicted family in all instances. They would steal out in spite of protests on my part, and some of them defied the law openly. I had one offender arrested hoping to make an example of him, but the justice lacked the back-bone to do his duty in the matter and the miscreant was allowed to go free. I then sent in my resignation, and last night the board appointed a constable to the place." In this outbreak there were reported to have occurred 50 cases and 11 deaths.

On November 17 an outbreak of diphtheria occurred in Grant township, St. Clair county, in which there were reported 17 cases and six deaths. In reporting concerning measures taken to restrict the disease when the first case occurred, the health officer, Dr. Lemuel Beal, stated that "The patient was not isolated," and that the house in which the case occurred was not disinfected by fumes of burning sulphur.

A Neglected Outbreak of Diphtheria at Ann Arbor, Michigan, which Spread to the Village of Brighton.

The following letter and diagram from J. A. Wessinger, M. D., give an interesting explanation of how diphtheria spreads when not properly restricted:

Ann Arbor, Mich., Dec. 5, 1891.

DEAR DOCTOR BAKER:—Inclosed you will find a hastily drawn chart of this city, in which I want to call your attention to the old, old, story of the spread of diphtheria when proper precautions against the disease are not taken. In the chart, No. 1 marks the first case of diphtheria in the city this fall. In this case no diagnosis was made; the child died and had a public funeral with several children as pall-bearers, at the church marked in chart. This death occurred about September 1. The other children of this family continued in school, at the schoolhouse marked in the chart.

Case No. 2 occurred about one week after death of No. 1. This child attended school at same house as the children of No. 1. No. 3 grew out of Nos. 1 and 2 through school and other association. Nos. 2 and 3 recovered. No. 4 was a young man, a dental student, attended church where funeral of No. 1 took place. This young man died early in October after a week's sickness. This case had a public funeral at same church as No. 1. No. 4 was not diagnosed as diphtheria. Now this case has an interesting sequel. This

young man while sick received a friendly visit from Miss B. H—, of Brighton, Michigan; four or five days after her return to Brighton she was taken seriously ill with diphtheria; this patient in turn received a friendly visit from Miss A. H—, who is a daughter of a prominent family of Brighton, and at this writing Miss A. H— lies dangerously ill with diphtheria.

Now to come back to Ann Arbor, case No. 5 was taken ill with diphtheria shortly after No. 4 had died. This case was a little girl attending school at place marked on chart and died after a brief illness,—no funeral. Cases 6 and 7 were little boys going to the same school and same room in school as the others. Nos. 6 and 7 are both dead. No. 8, on Main street, was imported from Dexter, Michigan, and was taken ill with diphtheria two days after arrival here. This case was fatal, together with two others in same house.

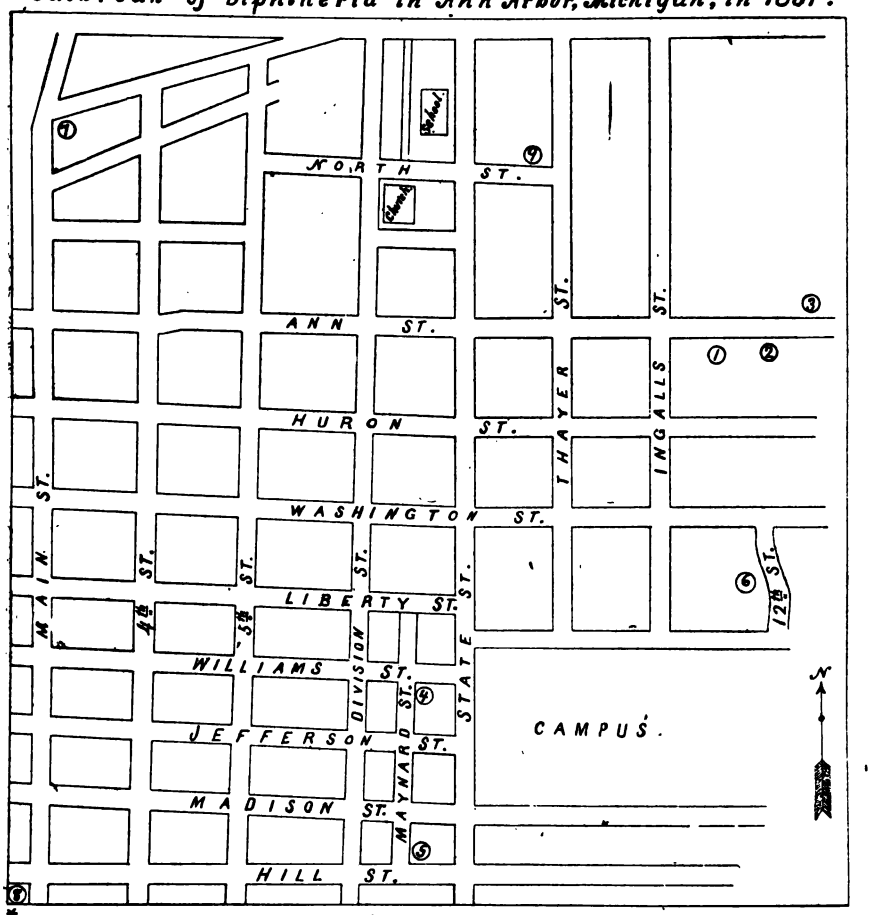
No. 9 is that of a young lady teacher in the school marked on chart; not only this but she is also a day boarder at the house where case No. 1 was fatally ill. This last case was mild and recovered. You will notice that out of case No. 1 have probably grown *all* the others save No. 8. You will also notice that out of this total number of ten cases there have been five deaths.

As stated in the beginning, this is the old, old story, and yet it is interesting to the student of this subject. I send you this as another weapon against those people who persist in saying that diphtheria is not contagious.

Yours very truly,

J. A. WESSINGER.

*Outbreak of Diphtheria in Ann Arbor, Michigan, in 1891.**



*Explanations are to be found in an accompanying letter from J. A. Wessinger, M. D., Ann Arbor, Michigan.

Outbreak of diphtheria in the village of Royal Oak, Oakland county.

October 13, 1891, an outbreak report was received from Dr. H. K. Lathrop, health officer of the village of Royal Oak and of Royal Oak township, Oakland county, relative to an outbreak of diphtheria in the village. He reported three children sick with the disease; stated that the danger of the spread of the disease was "considerable;" that he had placarded the house, but could not enforce complete isolation.

The usual circular letter on diphtheria, with blanks for report to this office, and pamphlets on its restriction and prevention, were immediately sent to him.

The following letter was received from Dr. Lathrop, Oct. 26:

DEAR SIR—I wish to consult you and have your advice with regard to a difficulty I have been having in the discharge of my duty as health officer of the village of Royal Oak, Oakland Co. The facts in the case are these: Upon the 9th day of October (the present month) I was called to visit a German family in this village by the name of Mow. I found three children, aged 1, 11, and 7, respectively, sick with chills which had been followed by fever. The tonsils were in all more or less coated with diphtheritic patches. The submaxillary glands were much swollen. I told the mother I feared diphtheria. She asked me to call the disease croup, and I refused, but told her I would wait until the next day and see. The next day another boy aged 11 was taken precisely like the other, also a boarder, a young man aged 22, was taken down precisely like the other. I immediately put a placard on the house, notified the State Board of Health, the president of the village, the school teachers, also. (I forgot to mention that the little girl aged 1 year, of those first taken, had the croupous breathing so common in those cases where the larynx and trachea are invaded.)

The mother of the family was much offended when I put up the notice on the house. Things went on very well until the 14th inst. when the diphtheria patches had nearly disappeared from all but the one aged 1 year, still had more or less of the croupous breathing, but very much less. On the 15th the mother came to my house and said they were so much better, I need not visit them any more. I warned the mother of the danger the little girl was in and saw them no more. On the morning of the 17th I learned that the little one was dead; that a young physician just located here, by the name of Hammond, had called on the family before I stopped visiting them and told them the disease was croup and not diphtheria. I went to the house and told the family they must not hold a public funeral, notified the minister also. This was Saturday, A. M. Saturday evening word was brought me that the placard on the house was taken down. Another complaint was made on Sunday morning. I then went to the house and found the placard was taken down. The family denied doing it, but were wild with anger when I told them I should put one up again before the burial, which was to be at 4 o'clock P. M. I went down with a witness at 2 o'clock and found a young man by the name of Finn, an undertaker, in the case. I went to go through the gate when Finn notified me I could not put up the placard until after the funeral. I attempted to put up the notice, when he laid hands upon me and forcibly put me off the place. I appealed to Mr. Mow, the owner, for assistance, which he refused, when I left the premises. I have not been back there since. This was Sunday, the 17th of October. Monday morning the 18th, I went to Pontiac and made the above statement to the prosecuting attorney of Oakland county, and asked him what I should do. He said he would arrest them—Finn and Mow. I swore to the complaint and the attorney said he would send the sheriff down that afternoon, which he did not do. Tuesday, the 19th, I went again and saw the prosecuting attorney; he then told me he had seen the other parties (Finn and Mow) and told them they had violated the law and that they must put up the notice again and I must take it down at the proper time, and must meet them half way towards a settlement. I told the prosecuting attorney that I denied his right to order up the placards, or Finn's right to put them up, as the law placed that in my hands as health officer, and that if Finn put up the notices, he could take them down when he saw fit, I should not take them down. He also informed me that Finn had fumigated the house.

Now what shall I do? Did I do right in the case or not? I do not feel disposed to go to the house again, as I fear violence. I think there is no use of my trying to do anything in Pontiac. Had I not better resign and let some young man that can fight his way through, have the job? I am about 68, and am not able to do the fighting. Please reply.

Very truly yours,

HENRY K. LATHROP.

The following letter was sent in reply, October 26:—

DEAR SIR:—Please accept thanks for your letter of October 22.

I think you did right to put up the placard, and also in putting the facts before the prosecuting attorney. From your statement it appears that the prosecuting attorney has not complied with the law, section 8442 Howell's statutes. This I regret very much, because it seems to stand in the way of the proper disinfection of the premises, and, therefore, may result in the spreading of this, one of the most dangerous diseases, and the loss of valuable lives.

You speak about the prosecuting attorney not being able to order you to do what the law requires. In this I think you are in error, because, although apparently, he has disregarded the law which requires him to prosecute the parties who disregarded your lawful and proper orders, he *may* comply with the law which requires him to prosecute the health officer who does not fulfill Act No. 137, laws of 1883, which requires health officers "To order the prompt and thorough isolation of those sick or infected with such disease, so long as there is danger of their communicating the disease to other persons," and also "To disinfect rooms, clothing and premises, and all articles likely to be infected, before allowing their use by persons other than those in isolation." If you fail to do this, you are liable to a fine "not exceeding one hundred dollars and the costs of prosecution, or in default of payment thereof, by imprisonment not exceeding ninety days in the county jail, in the discretion of the court," and for this failure the prosecuting attorney *may* perform his duties.

I see no way for you to act properly and safely (unless you resign, which I hope you will not do), except you thoroughly enforce the law, Act 137, Laws of 1883, pages 3 and 4 of our pamphlet, "The Work of Health Officers and of Local Boards of Health." The only thing that would let you off from the duty, would be, that your local board of health should instruct you to disregard that law. But I trust your local board of health has too much sense, and values human life too much, to do any such foolish thing. The premises of the Mow family, in which the diphtheria has occurred, should *certainly* be placarded by your order, until all danger of spreading the disease is past. You should order the isolation of every infected person, and ask the courts to aid you in enforcing the law.

I ask your attention especially to section 1640 and section 1651, Howell's statutes, page 19 of the "Laws of Michigan relating to Public Health." These two sections point out the methods of action in such cases as you describe, and I trust that thorough and complete action will be taken under these sections, and under Act 137, Laws of 1883, to the end that those premises shall be thoroughly disinfected.

To facilitate your action, I send you a marked copy of those laws by this mail.

Very respectfully,

HENRY B. BAKER, *Secretary*.

The following is a copy of a letter sent to the President of the village:

DEAR SIR:—I am informed that diphtheria is or has been recently present in your village on the premises of a Mr. "Mow," and that the orders of your health officer, Dr. Henry K. Lathrop, have been disobeyed by Mr. Mow and others in this,—that the persons did not remain in isolation after having been ordered so to remain by the health officer, and that the placard was removed from the premises after having been placed there by him, in accordance with law.

A severe penalty is incurred by any one who disobeys the order of the health officer made in accordance with the law. (See sections one and two of Act No. 137, Laws of 1883.)

It is very essential, that the "Mow" premises be thoroughly disinfected, and that all infected persons remain in isolation until all danger of the spreading of the disease is past, and especially so at this season of the year, as diphtheria tends to increase in cold weather. If the disease is allowed to spread, or proper precautions are not taken in this instance as required by law, it is very probable that the people of your village may be afflicted with this, one of the most dangerous diseases, during the coming winter, and that great difficulty may be encountered in stamping it out, and that valuable lives may be lost.

Section 1650 Howell's statutes gives any two justices of the peace certain powers in restricting persons infected with dangerous communicable diseases, and section 1651 Howell's statutes gives a single justice of the peace similar powers relative to infected clothing, etc.

I hope that you and your board of health will see that the laws are enforced, and that proper and necessary steps are taken *at once* to stamp out the disease. By this mail I send you marked copy of the public health laws.

A stamped envelope is enclosed for your reply.

Very respectfully,

HENRY B. BAKER, *Secretary*.

The following letter was sent to Geo. W. Smith, Prosecuting Attorney of Oakland county, October 27:—

DEAR SIR:—I am informed that a complaint in legal form was recently made to you by the health officer of the village of Royal Oak, in Oakland county, relative to the violation of his orders as health officer, by parties at, and owner of premises in his jurisdiction, where diphtheria was present, and that you suggested a compromise between the health officer and the violators of the law.

Section 8442 Howell's statutes, requires the prosecuting attorney "In all cases mentioned in the preceding section and *in all other* cases where the prosecuting attorney shall know or have good reason to believe that a penalty or forfeiture has been incurred within his county, *it shall be the duty of such prosecuting attorney, without delay, to prosecute for such penalty or forfeiture.*"

As the health officer has notified you, as the law requires, and, it is alleged, has sworn to the facts in the case, will you have the kindness to inform me why you have not "good reason to believe that a penalty and forfeiture has been incurred" within your county in this instance? I assume that *you* would not fail to comply with the law.

By this mail I send you marked pamphlets, etc., relating to this subject.

A stamped envelope is enclosed for your reply.

Very respectfully,

HENRY B. BAKER, *Secretary.*

The prosecuting attorney made the following reply October 28:—

DEAR SIR:—In answer to your letter of inquiry of yesterday as to the Royal Oak case, will say: That as the current saying now is you are "off the rug" as to your information owing probably to the excited condition of the one who informed you.

I think I am entirely familiar with these laws—and am quite disposed to enforce them thoroughly. I have children of my own. I believe I am the first prosecuting attorney who has succeeded in getting a judgment for a penalty for violation of this law, in Oakland county, which I did obtain against an influential physician here last year for not reporting a case.

As to this particular case there is but little use to sue for a penalty, from the irresponsibility of the parties. The complaint was taken for a criminal act under Act 15, S. L. 1891, and promptly endorsed by me. The facts don't fit the law very well, or the law does not fit the facts of this case, whichever way it should be stated.

I found on investigation that Mr. Mow, the father, is but an ignorant German—poor, and with five or six children dependent upon him for support, and think he did not himself take down the sign, that back of it all, is a quarrel between two young physicians and the undertaker upon one side, and Dr. Lathrop on the other, from professional jealousy and ill feeling. That the other physicians claimed it was not diphtheria at all, and are ready to so testify—though I believe myself they are wrong—that the other physicians did nothing themselves—no overt act—to become liable, but persuaded the undertaker to take down the sign; at least he took it down.

After the arrest of the undertaker and Mr. Mow they professed to be sorry. I saw Mr. Mow was poor and ignorant as I said before, and they promised faithfully to go immediately back and put up a new sign, and let it remain until the board of health should fumigate the house and give permission to take it down. They put up the sign as they agreed, and it is well known in Royal Oak that it was done by my requirement. I took pains it should be known.

I felt that Dr. Lathrop's authority would be better maintained by this course than by a contested trial in which both defendants might escape a conviction. There is doubt about their being technically guilty; I mean so I could actually secure a conviction. As it is, I have maintained before the people of Royal Oak Dr. Lathrop's authority, and have made no expense either to the defendants or to the county, of any amount, and taken no risks of their escaping entirely. Should they escape entirely on a trial, the law would be regarded in Royal Oak as useless and would be disobeyed more than ever.

Hope this explanation is satisfactory. If you still think a prosecution ought to proceed—if you will so state in a letter to me, and Dr. Lathrop will make the complaint over again—it shall go on. Or if you will telegraph tonight or early tomorrow, the present case can proceed, as the case would not be *nolle pros* until tomorrow morning at 10 A. M. * * * * .

Very respectfully,

GEO. W. SMITH, *Prosecuting Attorney.*

The following reply was sent to the prosecuting attorney:—

Accept very cordial thanks for your letters of October 28 and 29, which I find on my return, informing me of the details relative to the violation of the orders of the health officer at Royal Oak. It is useful for me to have these facts in mind.

Relative to the question of prosecution,—I wish to express my confidence in your judgment, and I understand that Dr. Lathrop now concurs in your view of the case.

On the following day, October 29, the prosecuting attorney again wrote:—

After writing you yesterday, I talked with Dr. Gray of your Board in presence of attorney for defendants in case from Royal Oak, and he knows both sides of the affair to some extent.

Have decided to leave the matter entirely to Dr. Gray and yourself, and have so notified Dr. Lathrop. Wish you would talk it over, communicate further with Dr. Lathrop if you wish and advise me what you desire done. Have had adjournment of case by agreement for one week, until November 5, in order to give you time to consider the matter. Hope to hear further before that time.

October 30, Dr. Lathrop wrote:—

DEAR SIR:—Many thanks for your letter of advice regarding the violation of the health laws in this place. The accused agree to obey the same hereafter, and not to interfere with the health officer, or his orders. I think perhaps it would do more good to let the matter rest at that than it would to go any further, with the understanding, that, should there be any further violation of the law, prosecution will be commenced at once.

There was an outbreak of diphtheria in Royal Oak township November 7, the source of the contagium of which was the Mow family in the village of Royal Oak. November 12, an outbreak report relative to diphtheria in Royal Oak township was received from Dr. Lathrop, the health officer, accompanied by the following letter:—

The case of Florence Elwood is the extension from the Mow family which I have written you about lately, and had so much trouble with.

Mr. Elwood lives about 4 miles from the Mow family, but one of the Mow boys worked at Elwood's, and contrary to my orders, went home and attended the funeral of the Mow child that died of diphtheria. He went back to Elwood's and without any doubt carried the contagion. The child will die, the attending physician notifies me.

The following item appeared in the Detroit Tribune, November 18:—

Royal Oak, Mich., Special telegram, Nov. 17.—Diphtheria is getting a strong hold on this village and vicinity. There is considerable exitement, as the cases are very strongly marked and are proving much more than usually fatal. Coupled with the exitement is a strong undercurrent of indignation, as it is conceded that had the parents of the children, who were first taken with the disease, properly reported and taken care of the cases, its spread would have been unlikely. Three deaths have already occurred. The outbreak occurred in the family of Joseph Mow, a German. Three of their children, aged respectively eleven, nine and one, were taken sick with diphtheria October 9, as was also a boarder. All the cases were well marked. October 11, another child was taken. Of these the youngest died, October 17, the rest recovered. October 18, a young man, aged sixteen, living a few rods from Mow, was taken ill. He is slowly recovering. November 9, Florence Elwood was taken, and died Nov. 12. May Elwood, her mother, was taken November 12, and is recovering. George Watts, aged thirty, was taken November 12, and died November 15. Edith Morris, aged 13, in the same family, was taken November 13, and is still very sick. Belle Wilcox was taken sick today. Most of these cases are directly traceable to the first cases, taken October 9.

In the outbreak in the township there occurred 7 cases and 3 deaths to be added to the 8 cases and 2 deaths in the village, making at least 15 cases and 3 deaths, chargeable apparently to interference with the health officer of the village and disregard of his orders.

Neglect of an Outbreak of Diphtheria at Howard City.

Several complaints were received at this office in the latter part of November and first part of December, 1891, from citizens of Howard City and its vicinity relative to the presence of diphtheria in the village of Howard City. These complaints alleged that but little or no action was being taken by the health authorities to restrict the spread of the disease in the village or into the surrounding country. Several letters were sent

to the health officer of the village, urging prompt measures for the restriction of the disease. The complaints still continuing to be made by the people, and no satisfactory responses having been received from the health officer of the village, the following letter was sent, December 16, to the prosecuting attorney of Montcalm county:—

MICHIGAN STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY,
Lansing, Mich., December 16, 1891.

FRANK A. MILLER, *Prosecuting Attorney of Montcalm Co., Stanton, Mich.:*

DEAR SIR:—Repeated complaints reach this office from citizens of Howard City and neighboring localities that the health officer of Howard City is not complying with the public health laws. Today two letters on that subject are received. One of them says:

"Diphtheria is quite prevalent here and there has been little or no action taken by the health officer or people toward preventing the spread of the disease. School is allowed to go on and parties living in the same house where the disease is, are allowed to mingle with others who have not been exposed.

"A Mr. Higgins has lost three children and Mrs. Higgins has been removed to Mr. Booth's house. Mr. Booth and Mr. Clark (who boards with Mr. Booth) are both night watchmen at the D. L. & N. roundhouse and are still on duty, which I think ought not to be.

"Please give it your attention and oblige."

Last November there were similar complaints. The health officer was written to, by this office. He responded, claiming that every precaution had been taken and promising to send reports to this office, as the law requires. Such reports have not been received. Since he seems to violate that law, which requires reports to, and coöperation with, this office, we can readily believe that he disregards the other law as alleged in the letters to this office.

From the foregoing it would seem as if valuable lives were being lost by lack of proper precautions in restricting the disease, and because of violations of the laws—one of which requires the health officer to take action to restrict the spread of every "disease dangerous to the public health." (Act No. 137, Laws of 1883.)

Section 2, of Act 137, Laws of 1883, makes it a misdemeanor for any person (which I suppose includes the health officer) to violate any of the provisions of section 1, punishable by a fine, and by imprisonment if the fine is not paid.

I write this suggesting,—whether you are not required to act under section 8442, Howell's statutes, in this instance, because I believe the health officer has incurred a forfeiture.*

Very respectfully,
HENRY B. BAKER, *Secretary.*

P. S. *If the health officer *has*, under Act 137, Laws of 1883, ordered "prompt and thorough isolation of those sick and infected," it would seem that other persons have incurred forfeitures under that act, and, in any event, according to reports to this office, there has been violation of Act 15, Laws of 1891, a copy of which I send herewith.

The prosecuting attorney of Montcalm county replied, January 5, 1892, as follows:—

DEAR SIR:—Yours of the 16th of December was received while I was sick and unable to attend to business of any kind. Your letter was the first information I had. I shall be at Howard City next week and will investigate the matter and inform you.

The same mail that brought the letter from the prosecuting attorney brought the following from the health officer of Howard City:—

DEAR SIR:—I failed to make out my weekly report last week, on account of being sick abed with la grippe. I have today made out a final report as best I could with the blank I had. I thought I had a final report blank for diphtheria but I don't find it. If the one I send today is not sufficient, send a proper blank and I will make out a new one. The last outbreak of diphtheria was controlled all right and kept from spreading. The la grippe is all that we are having here at present.

The proper blank for a final report was sent the health officer immediately and was filled out by him and promptly returned. In this outbreak there were reported to have occurred 9 cases and 3 deaths.

OUTBREAKS IN WHICH ISOLATION AND DISINFECTION WERE ENFORCED,—RESULTS.

The following is the substance of a few health officers' statements which are representative of the statements of those health officers whose reports indicated that they had quite carefully enforced isolation and disinfection:—

Relative to an outbreak of diphtheria in Hamburg township, Livingston county, which was confined to the first case, the health officer, Dr. James F. Lennon, reported in substance that the following measures were taken to restrict the disease:—

The patient was kept isolated from all other persons except the nurse and physician. The discharges of the patient were disinfected with sulphate of copper and buried. All rooms in the house and the bedding and clothing were disinfected with the fumes of burning sulphur at the rate of over two pounds of sulphur per 1,000 cubic feet of space. There were no exceptions to these measures of isolation and disinfection.

Concerning the measures taken to restrict an outbreak of diphtheria in the village of Romeo, the health officer, Dr. John B. Fares, reported in substance as follows:—

The house was placarded, and the patient was isolated from all other persons except the nurse and physician. The discharges of the patient were disinfected by carbolic acid and buried. After the outbreak was over all rooms in the house together with infected bedding, clothing, etc., were disinfected with fumes of burning sulphur at the rate of four pounds of sulphur per 1,000 cubic feet of space.

In reporting the measures taken to restrict an outbreak of diphtheria in Ford River township, Delta county, in which there occurred but one case, the health officer, O. E. Nelson, stated substantially as follows:—

The patient was kept isolated from all other persons except nurse and physician, and a watchman was placed on the street to prohibit communication. The discharges of the patient were burnt, and the privy vault was disinfected by fresh chloride of lime. When the outbreak was over, all rooms in the house, and the privy, and all clothing worn by nurse, and all clothing, bedding, etc., exposed to infection were disinfected by fumes of burning sulphur at the rate of two and a half pounds of sulphur per 1,000 cubic feet of space.

As to the measures employed to restrict the outbreak of diphtheria in Kalamazoo township, Kalamazoo county, in which there occurred but one case, the health officer, Dr. H. H. Schaberg, reported substantially as follows:—

The patient, mother, and nurse were confined to two rooms, and kept isolated from other persons except the physician; food was placed on trays at door of room, and taken in when bearer had departed. The discharges were passed in vessels containing solution of copperas and were then buried. The contents of the privy-vault were disinfected with chloride of lime, unslaked lime, and copperas. All clothing worn by patient, mother and nurse, and all exposed linen and clothes were burned. At the close of the outbreak all rooms in the house, with their contents, and the privy were disinfected by fumes of burning sulphur at the rate of four pounds of sulphur per 1,000 cubic feet of space. The paper was removed from rooms and they were repapered.

Concerning the measures taken to restrict the outbreak of diphtheria in Allouez township, Keweenaw county, which was confined to the first case,

the health officer, Dr. Fred K. Smith, reported in substance as follows:—

The house was placarded and isolated and the patient was isolated from all other persons except parents, nurse and physician. The discharges were buried at a distance from the house. The clothing, bedding, etc., were disinfected in boiling corrosive sublimate solution. When the case recovered the house was disinfected by burning 60 pounds of sulphur, which was about three pounds per 1,000 cubic feet of space.

Relative to the measures employed to restrict an outbreak of diphtheria in the village of Bear Lake, which was restricted to the first case, the health officer, Dr. C. A. Norconk, reported substantially as follows:—

The patient was kept isolated, and none allowed to enter the house but the father, mother, and physician. The discharges were disinfected with bichloride of hydrogen solution and buried at safe distance. The contents of the privy-vault were disinfected by two pounds of fresh chloride of lime. The clothing, bedding, etc., were disinfected by sulphate of zinc, and burning sulphur. When the case recovered all rooms in the house were disinfected by fumes of burning sulphur at the rate of three pounds per 1,000 cubic feet of space.

ESTIMATED NUMBER OF OUTBREAKS AND CASES OF DIPHTHERIA PREVENTED AND LIVES SAVED BY ISOLATION AND DISINFECTION.

Tables 7 and 8 and the following diagram compare the average numbers of cases and deaths in outbreaks of diphtheria where the measures of isolation and disinfection, prescribed by the Michigan State Board of Health, were enforced, with the average numbers of cases and deaths in those outbreaks where these measures were neglected.* By Table 8 it may be seen that during the six years, 1886-91, there were over five times as many cases and over five times as many deaths in those outbreaks in which these measures were neglected as in those outbreaks in which they were enforced.

By Table 7 it may be seen that during the year 1891 there were reported to the office of the State Board of Health 532† outbreaks of diphtheria, with 2,965 cases and 643 deaths. Had no efforts at restriction been made, and had the average numbers of cases and deaths per outbreak remained the same as in the column headed "Isolation and Disinfection both Neglected," there would have occurred 6,357 cases and 1,309 deaths, and taking from these respectively the cases (2,965) and deaths (643) which did occur, leaves 3,392 cases and 666 deaths indicated as prevented in these 532 outbreaks, by isolation and disinfection. By the same method the indicated saving in the 2,517 outbreaks which occurred during the six years, 1886–91, is 19,450 cases and 3,644 lives.

* In the compilation of the reports for Tables 7 and 8 and the diagram showing the results obtained by isolation and disinfection, every effort has been made to place the numbers of cases and deaths in each outbreak in the proper columns. If, for instance, there were only one or two cases in an outbreak and the health officer neglected to isolate or disinfect, but for some reason the disease spread no further, the number of cases and deaths were placed in the column headed "Isolation and Disinfection both Neglected." If, on the other hand, as often occurs, quite a number of persons are exposed at the same time and place outside the health officer's jurisdiction, and by proper isolation and disinfection he succeeds in confining the disease to the original cases exposed, they are placed in the column headed, "Isolation and Disinfection Enforced." If, however, he neglects to properly isolate or disinfect, the whole number of these cases and deaths are placed in the "neglected" column. It is to be regretted that many of the reports received at this office do not state exactly what was done to restrict the disease, or are not sufficiently definite to enable the compilers to decide just what was done, and they are obliged to place all such in the column headed "Isolation or Disinfection or both not mentioned, or statements doubtful."

† Whenever a break of 60 days or more has occurred in the progress of a communicable disease in a given township, village or city, it has hitherto been regarded as two different outbreaks, but in estimating outbreaks for these tables, 7 and 8, and the corresponding tables for scalet fever, if the second appearance of the disease originated from the first the intermission was disregarded and it was treated as a single outbreak. Also, comparisons of *years* require that outbreaks be counted as closed at the close of the *year*; while in comparing *outbreaks* for testing the value of isolation and disinfection it is necessary to take *complete outbreaks*, even where they extend from one year into the next. This explains the apparent discrepancy between the number of outbreaks here given and the number given at the beginning of this article.

ISOLATION AND DISINFECTION RESTRICTED DIPHTHERIA IN 1891.

Diphtheria in Michigan in 1891:- Exhibiting the Average numbers of cases and deaths per outbreak:- in all outbreaks in which Isolation and Disinfection were both Neglected; and in all outbreaks in which both were Enforced. (Compiled in the office of the Secretary of the State Board of Health, from reports made by local health officers.)

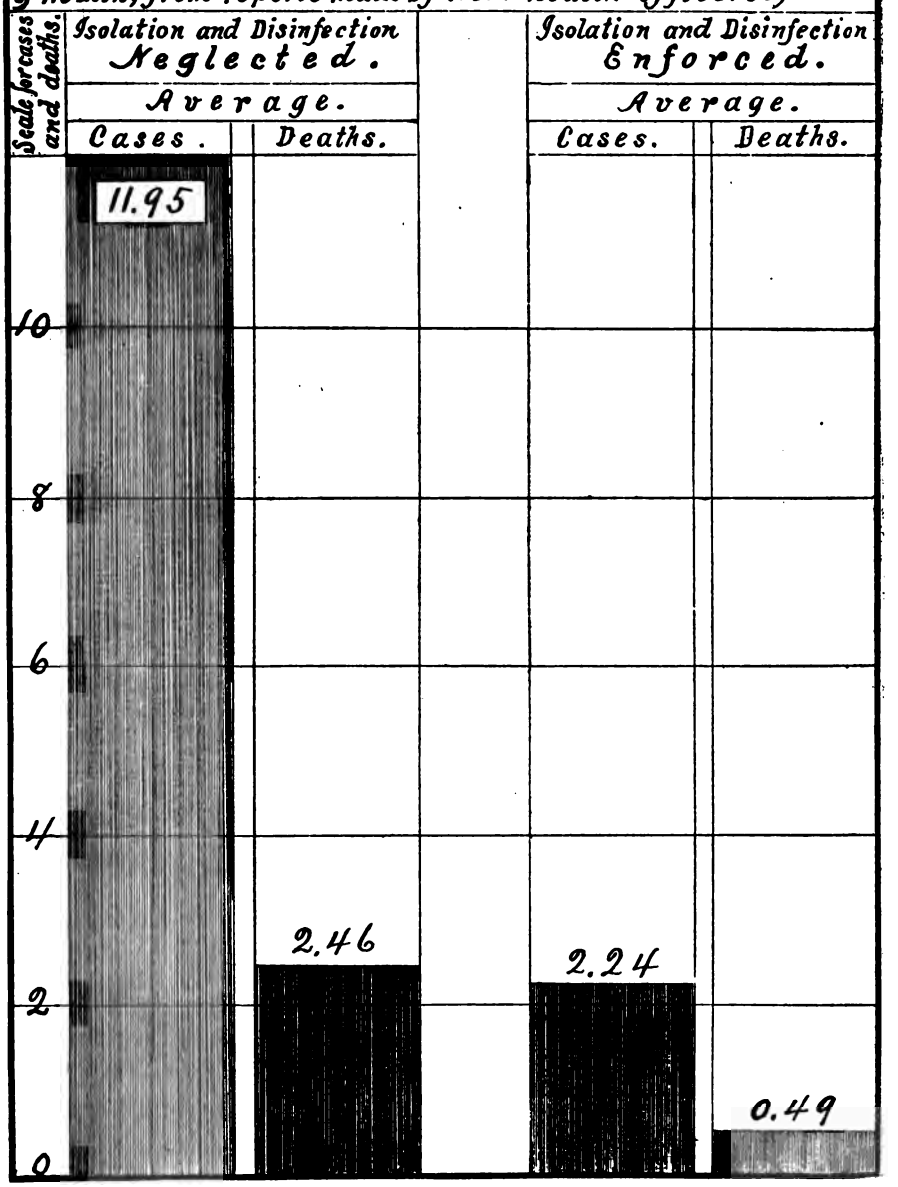


TABLE 7,—*Diphtheria in Michigan in 1891: Exhibiting the Averave Numbers of Cases and Deaths per Outbreak:—(1) in all the 532 outbreaks reported; (2) in the 366 outbreaks in which it is doubtful whether or not Disinfection or Isolation was enforced; (3) in the 14 outbreaks in which Isolation was neglected and Disinfection was enforced or doubtful; (4) in the 11 outbreaks in which Disinfection was neglected and Isolation was enforced or doubtful; (5) in the 23 outbreaks in which Isolation was enforced and Disinfection was neglected; (6) in the 9 outbreaks in which Disinfection was enforced and Isolation was neglected; (7) in the 79 outbreaks in which both Isolation and Disinfection were neglected; (8) in the 70 outbreaks in which both Isolation and Disinfection were enforced.*

	(1) All outbreaks. (532 outbreaks.*)		(2) Isolation or Disinfection or both not mentioned, or statements doubtful. (366 outbreaks.)		(3) Isolation neglected, Disinfection enforced or doubtful. (14 outbreaks.)		(4) Disinfection Neglected, Isolation enforced or doubtful. (11 outbreaks.)		(5) Isolation enforced, Disinfection neglected or doubtful. (23 outbreaks.)		(6) Disinfection enforced, Isolation neglected or doubtful. (9 outbreaks.)		(7) Isolation and Disinfection both neglected. (79 outbreaks.)		(8) Isolation and Disinfection both enforced. (70 outbreaks.)	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Totals	2,965	643	1,777	389	135	31	74	19	63	16	68	21	944	194	157	33
Averages..	5.57	1.21	4.86	1.06	9.64	2.21	6.73	1.73	2.74	0.70	7.56	2.33	11.95	2.46	2.24	0.47

* These do not include the cases and deaths in Detroit and Grand Rapids because of the difficulty in determining the beginning and ending of an outbreak in these cities, in which the disease is present in some part of the city nearly all the time. See foot-note on 170.

TABLE 8.—*Exhibiting for the six Years, and for each of the six Years, 1886-91, the Number of reported Outbreaks, Cases and Deaths; also for this six-year Period, the average Number of Cases and Deaths per Outbreak in all Outbreaks; in those Outbreaks in which Isolation or Disinfection was Doubtful; in which both Isolation and Disinfection were Neglected; in which both Isolation and Disinfection were Enforced; and also the Number of Cases and Deaths Indicated to have been prevented by Isolation and Disinfection.*

Years.	Indicated Saving of Cases and Lives by Isolation and Disinfection.*		All outbreaks.†			Isolation or Disinfection, or both, not Mentioned, or Statements Doubtful.			Isolation and Disinfection, both Neglected.			Isolation and Disinfection, both Enforced.		
	Cases.	Deaths.	Outbreaks.	Cases.	Deaths.	Outbreaks.	Cases.	Deaths.	Outbreaks.	Cases.	Deaths.	Outbreaks.	Cases.	Deaths.
1886	* 4,374	* 533	461	3,085	656	243	1,103	250	‡ 102	‡ 1,650	‡ 329	116	332	77
1887	§ 3,132	733	398	2,321	561	202	732	190	60	822	195	78	198	51
1888	§ 3,292	§ 416	311	1,529	324	199	810	189	34	527	81	58	101	31
1889	§ 2,398	570	376	1,986	418	254	1,314	280	41	478	108	63	98	14
1890	§ 2,862	426	439	2,718	619	291	1,649	401	71	902	169	46	70	15
1891	§ 3,392	666	532	2,965	643	366	1,777	389	79	944	194	70	157	33
Totals	19,450	3,644	2,517	14,599	3,221	1,555	7,385	1,699	387	5,323	1,076	431	956	221
Averages	3,242	607												
Av. cases and deaths per outbreak				5.80	1.28		4.75	1.09		‖ 13.75	‖ 2.78		2.22	0.51

* For the years 1886 and 1887 the numbers of cases and deaths in this double column are found by multiplying "all outbreaks" for the year by the average number of cases or deaths per outbreak in those outbreaks in which Isolation or Disinfection or both were Neglected, for that year, and deducting from the result thus obtained, the cases or deaths, as the case may be, which were *reported* to have occurred that year.

† Outbreaks in Detroit and Grand Rapids not included.

‡ The figures for the first year (1886) in this column are for outbreaks in which "Isolation or Disinfection or Both were Neglected,"—outbreaks not having been compiled for the column "Isolation and Disinfection Both Neglected" for that year, as there were too few reports of outbreaks which could be thus classified.

‖ Average for the five years 1887-91.

§ For the years 1886-91 these results are obtained in the same manner as stated in the (*) foot note above, except that "All Outbreaks" for each year are multiplied by the average number of cases or deaths per outbreak in those outbreaks in which "Isolation and Disinfection both were Neglected."

The above indicates only the lives saved and cases prevented in localities *after the outbreaks had commenced.* But there were many *outbreaks* prevented in the State, for the reason that isolation and disinfection by restricting the number of cases of diphtheria in the outbreaks which did occur probably in the same proportion prevented the disease from spreading from those localities and starting additional outbreaks in other localities,—there being that proportion less of diphtheritic cases to communicate the disease to persons in the uninfected localities, and the cases which did occur being less likely to communicate the disease than if there had been no measures taken in the State to prevent diphtheria from spreading. In this way it is believed that the *number of outbreaks* in Michigan during 1891 was restricted in about the same proportion as the *number of cases* in all outbreaks was restricted; that is, about 53 (53.36) per cent, or 609 outbreaks were prevented by isolation and disinfection. Assuming that in these 609 outbreaks the average numbers of cases and deaths per outbreak would have been the same as they averaged in those outbreaks where isolation and disinfection were neglected (11.95 cases and 2.46 deaths) there is indicated a probable additional saving of about 1,498 lives and 7,278 cases by preventing *outbreaks* through isolation and disinfection during 1891,—making the total indicated saving for the year 2,164 lives and 10,670 cases. By the same method there is indicated a probable total saving during the six years, 1886–91, of about 12,965 lives and 65,554 cases, by the measures prescibed by the Michigan State Board of Health,—an average saving of 2,161 lives and 10,926 cases per annum during the six years.

VITALITY OF THE DIPHTHERIA GERM.

The following extracts from the reports of health officers bear upon the question as to the length of time the diphtheria germ will retain sufficient vitality to set up diphtheria:

"From an old deserted building where a family had lived and had it the year before, and the children went there to play, and there is where it started from."—*Thomas M. Snyder, Tobacco township, Gladwin county.*

"The family visited at Mr. W——'s, in Byron township, who had assisted in laying out two children who died of diphtheria last May" [This outbreak began August 25, 1891.]—*J. K. Hanna, M. D., Gaines township, Kent county.*

"The first case is supposed to have been taken from staying in a house where the disease had been a few years ago, and brought to Hatton."—*D. W. Comer, Clerk of the Board of Health, Hatton township, Clare county.*

"In first case supposed to be possibly retention of contagium in the house from the time of a previous outbreak, six months before."—*Fred K. Smith, M. D., Allouez township, Keweenaw county.*

"In case number one, the W— woman, two children died in the house about six months ago; house said to have been disinfected."—*William Blake, M. D., Lapeer.*

"Cause not known as yet, but supposed to have been contracted from clothing of diphtheria case more than 20 years ago."—*H. A. Lounsbury, M. D., Berlin township, St. Clair county.*

"I think the source of contagium was an old log house in Greenfield township. The house is old and almost useless and should be burned or torn down as it is impossible to thoroughly disinfect it."—*Thomas W. Shields, M. D., Redford township, Wayne county.*

PERIOD OF INCUBATION, IN DIPHTHERIA.

TABLE 9.—*Exhibiting the reported Period of Incubation, stated in days, in 103 cases of Diphtheria. Compiled from reports of health officers in Michigan, for the year 1891.*

Incubation period—Days	1	2	3	4	5	6	7	8	9	10	12	14	15	21
Cases in each period	1	8	10	*17	11	4	†19	‡6	15	§8	2	¶8	‖3	**1

* In 1 of these cases it was reported as *about* 3 days.
† In 10 of these cases it was reported as *about* 7 days.
‡ In 1 of these cases it was reported as *about* 8 days.
§ In 2 of these cases it was reported as *about* 10 days.
¶ In 1 of these cases it was reported as *about* 14 days.
‖ In these 3 cases it was reported as *about* 15 days.
** This case was reported as *about* 3 weeks.

The average period of incubation of diphtheria in the 103 cases is 7.30 days.

TABLE 10.—*Exhibiting, relative to Diphtheria in Fourteen Instances in Michigan in 1891, the Reported Period of Incubation, within certain Limits, stated in Days; also the Means, the Average of which may Represent the Average Period of Incubation.*

Days (In three Instances.)	Means.	Days (In three Instances.)	Means.	Days (In three Instances.)	Means.	Days (In three Instances.)	Means.	Days (In two Instances.)	Means.
1 to 2	1.5	3 to 16	9.5	4 to 16	10.0	7 to 9	8.0	7 to 14	10.5
2 to 7	4.5	3 to 21	12.0	5 to 7	6.0	7 to 9	8.0	10 to 12	11.0
2 to 18	10.0	4 to 5	4.5	6 to 8	7.0	7 to 10	8.5		

The average of all the means, for the 14 instances, is 7.93 days.

SCARLET FEVER IN MICHIGAN.

REPORT FOR THE YEAR ENDING DECEMBER 31, 1891.

During the year ending December 31, 1891, there were reported to the office of the Secretary of the State Board of Health 605* outbreaks of scarlet fever in 516 localities in Michigan. In these outbreaks there were reported to have occurred 6.212 cases and 286 deaths. The following map and tables 1 and 2 show for this year the distribution of scarlet fever throughout the State, and its comparative prevalence in the various counties. The map exhibits for each county, from which scarlet fever was reported during the year, the number of localities at which this disease prevailed; and the numbers of outbreaks, cases and deaths reported to have occurred in those localities. Table 1 goes a step further and shows the number of cases from scarlet fever, per 10,000 of estimated population, which were reported to have occurred in each county during the year. Table 2, which gives the number of reported cases of sickness from this disease per 10,000 of estimated population, by tiers of counties (calling the counties of the upper peninsula one tier), is designed to further facilitate the study of the distribution of scarlet fever throughout the State during the year.

From thirteen counties of the State—Alcona, Alger, Iosco, Isle Royal, Leelanaw, Luce, Mackinac, Manitou, Montmorency, Ogemaw, Oscoda, Presque Isle and Roscommon, having an aggregate population of 59,655, there were no reports of sickness from scarlet fever during the year.

It is noticeable that the greatest prevalence of this disease during the year, existed in Keweenaw, Houghton, Kalkaska and Kent counties, in which the reports show that, respectively, 326.4, 200.6, 91.0 and 59.2 cases, per 10,000 of population, occurred. The sickness rates in Allegan, Iron, Marquette, Newaygo and Shiawassee counties were also largely in excess of the average rate for the whole State.

The reports received indicate that the least sickness from scarlet fever during the year, outside those counties from which none was reported,

* It is sometimes difficult to decide whether cases in a given place constitute one outbreak or more than one. In connection with a table and diagram on following pages the number of outbreaks is stated differently, but a foot-note gives the reason why.

occurred in Arenac, Delta, Gladwin, Schoolcraft and Missaukee counties, where the sickness-rates were respectively 1.7, 1.8, 2.2, 3.2 and 3.7 per 10,000 of population.

Considering the State by tiers of counties, Table 2 shows that, the greatest prevalence of scarlet fever was in the Upper Peninsula tier, where the sickness-rate reached 62.5 cases per 10,000 of population; and that the least prevalence was in the tenth tier where the sickness-rate was only 5.3 cases per same number of population. The sickness-rates in the fourth and ninth tiers, although not so high as that of the Upper Peninsula, were considerably higher than the average rate for the State. Seeing that scarlet fever, in 1891, was over 50 per cent more prevalent in the Upper Peninsula than the average prevalence for the whole State, and about 32 per cent greater than for any other tier of counties, the question may arise, why this preponderance of prevalence in the Upper Peninsula over that of any other part of the State? The fact may perhaps be attributable to one of several causes, or to the combined influence of those causes: (1) Climatic conditions. The protracted winters of the Upper Peninsula; the coldness of the climate probably tends to cause sore throats and thus render the body less able to resist the development of the germs of the disease. In this connection, reference to table 12 further on in this article, shows that the greatest prevalence of scarlet fever in 1891, as reported by health officers to this office, occurred in the winter months, the maximum being reached in January. (2) Foreign immigration,—a large proportion of the foreign immigrants to the State go to the Upper Peninsula. Many of them come to this country in infected ships, where they or their clothing, or baggage, may have become infected by disease germs, and the contagium thus carried to the places of destination of the immigrants, there to multiply the foci whence contagious diseases are spread. (3) In the Upper Peninsula there is comparatively little rural or isolated population. The inhabitants are chiefly massed in cities, villages and mine "locations," thus facilitating the spread of any contagious disease which may appear among them. That communicable diseases do spread more in centres of population than in the rural districts, seems to be demonstrated by the following instances: In 1891, the sickness-rate from scarlet fever in Wayne county, was 34.4 per 10,000 of population. In Detroit for the same year, the sickness-rate per same number of inhabitants, was 38.1, and in the county, outside of Detroit, the sickness rate was only 18.9 per 10,000. In Kent county, relative to the same year and disease, similar facts are discernable. For the county the sickness-rate is 59.2 per 10,000 of population, in Grand Rapids it is 87.3, and for the county, exclusive of Grand Rapids, it is only 24.0.

DISTRIBUTION OF SCARLET FEVER IN MICHIGAN IN 1891.

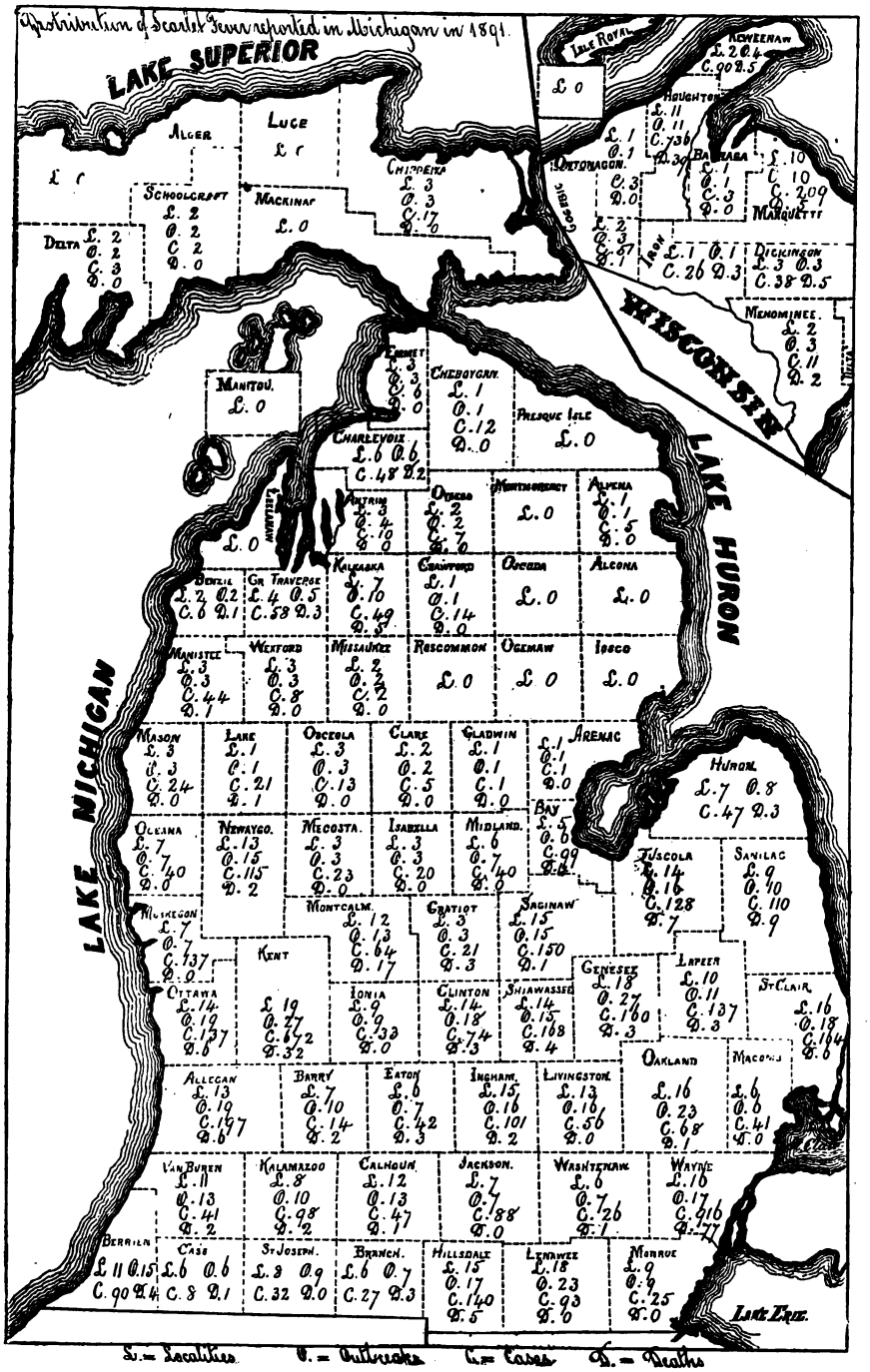


TABLE 1.—*Exhibiting the Estimated Population of Michigan for the Year 1891, by counties, also the number of cases of Scarlet Fever* REPORTED *from each county for 1891, and the number of cases per 10,000 estimated population of each county.*

Counties.	Estimated population of Michigan for 1891.*	Reported Cases of Scarlet Fever, 1891.	Reported Cases per 10,000 Estimated Population.	Counties.	Estimated population of Michigan for 1891.*	Reported Cases of Scarlet Fever, 1891.	Reported Cases per 10,000 Estimated Population.
State	2,189,584	6,212	29.	Keweenaw	2,757	90	326.4
				Lake	6,882	21	30.7
Alcona	5,639	0	0	Lapeer	29,120	137	47.0
Alger	1,293	0	0	Leelanaw	8,118	0	
Allegan	39,076	197	50.4	Lenawee	48,459	93	19.2
Alpena	16,260	5	3.1	Livingston	20,719	56	27.0
Antrim	10,931	10	9.1	Luce	2,701	0	
Arenac	5,958	1	1.7	Mackinac	8,323	0	
Baraga	3,159	3	9.5	Macomb	31,832	41	12.9
Barry	23,630	14	5.9	Manistee	25,400	44	17.3
Bay	58,538	99	16.9	Manitou	813	0	
Benzie	5,417	6	11.1	Marquette	39,368	209	53.1
Berrien	41,735	90	21.6	Mason	17,017	24	14.1
Branch	26,676	27	10.1	Mecosta	20,269	23	11.3
Calhoun	44,006	47	10.7	Menominee	21,894	11	5.0
Cass	20,848	8	3.8	Midland	11,033	40	36.3
Charlevoix	10,143	48	47.3	Missankee	5,398	2	3.7
Cheboygan	12,532	12	9.6	Monroe	32,209	25	7.8
Chippewa	12,696	17	13.4	Montcalm	32,586	64	19.6
Clare	7,895	5	6.3	Montmorency	1,636	0	
Clinton	26,350	74	28.1	Muskegon	41,356	137	33.1
Crawford	3,142	14	44.6	Newaygo	21,055	115	54.6
Delta	16,182	3	1.8	Oakland	41,216	68	16.5
Dickinson	15,936	38	23.8	Oceana	16,098	40	24.8
Eaton	32,181	42	13.1	Ogemaw	5,953	0	
Emmet	8,968	6	6.7	Ontonagon	3,875	3	7.7
Genesee	39,451	160	40.6	Osceola	15,015	13	8.7
Gladwin	4,516	1	2.2	Oscoda	2,048	0	
Gogebic	14,483	51	35.2	Otsego	4,502	7	15.5
Gd. Traverse	13,848	58	41.9	Ottawa	35,581	137	38.5
Gratiot	29,341	21	7.2	Presque Isle	4,844	0	
Hillsdale	30,454	140	46.0	Roscommon	2,090	0	
Houghton	36,681	736	200.6	Saginaw	84,591	150	17.7
Huron	29,391	47	16.0	Sanilac	33,214	110	33.1
Ingham	38,065	101	26.5	Schoolcraft	6,311	2	3.2
Ionia	32,694	33	10.1	Shiawassee	31,341	168	53.6
Iosco	16,059	0		St. Clair	52,696	164	31.1
Iron	4,420	26	58.8	St. Joseph	25,229	32	12.7
Isabella	19,447	20	10.3	Tuscola	33,185	128	38.6
Isle Royal	143	0		Van Buren	30,515	41	13.4
Jackson	45,331	88	19.4	Washtenaw	42,246	26	6.2
Kalamazoo	39,766	93	24 6	Wayne	266,151	916	34.4
Kalkaska	5,382	49	91.0	Wexford	11,724	8	6.8
Kent	113,589	672	59.2				

* Figures in this column are taken from the Vital Statistics of Michigan (Registration Report, 1891, pp. 16-18.

TABLE 2.—*Exhibiting the Estimated Population of Michigan for the year 1891, by tiers of counties (Upper Peninsula as one tier); also the number of cases of Scarlet Fever* REPORTED *from each of these divisions for 1891, and the number of cases per 10,000 estimated population of each division.*

Counties in Groups, most Northern ones First.					Estimated Population, 1891.*	Reported Cases of Scarlet Fever, 1891.	Reported Cases per 10,000 of Popul'tion.
State					2,139,584	6,212	29.0
Upper Peninsula	Alger. Delta. Schoolcraft. Luce.	Mackinac. Chippewa. Isle Royal. Keweenaw.	Houghton. Ontonagon. Gogebic. Baraga.	Marquette. Iron. Menominee. Dickinson.	190,217	1,189	62.5
Eleventh tier of counties	Manitou. Emmet. Charlevoix.	Ceboygan. Presqueisle.			37,300	66	17.7
Tenth tier of counties	Leelanaw. Antrim. Otsego. Montmorency.	Alpena.			41,442	22	5.3
Ninth tier of counties	Benzie. G. Traverse. Kalkaaka.	Crawford. Oscoda. Alcona.			35,476	127	35.8
Eighth tier of counties	Manistee. Wexford. Missaukee. Roscommon.	Ogemaw. Iosco.			66,624	54	8.1
Seventh tier of counties	Mason. Lake. Osceola. Clare.	Gladwin. Bay. Huron. Arenac.			145,162	211	14.5
Sixth tier of counties	Oceana. Newaygo. Mecosta. Isabella.	Midland.			87,902	238	27.1
Fifth tier of counties	Muskegon. Montcalm. Gratiot. Saginaw.	Tuscola. Sanilac.			254,273	610	24.0
Fourth tier of counties	Ottawa. Kent. Ionia. Clinton.	Shiawassee. Genesee. Lapeer. St. Clair.			360,322	1,545	42.8
Third tier of counties	Allegan. Barry. Eaton. Ingham.	Livingston. Oakland. Macomb.			226,719	519	22.9
Second tier of counties	Van Buren. Kalamazoo. Calhoun. Jackson.	Washtenaw. Wayne.			468,045	1,216	26.0
First tier of counties	Berrien. Cass. St. Joseph. Branch.	Hillsdale. Lenawee. Monroe.			225,610	415	18.4

* Taken from Vital Statistics of Michigan, (Registration Report 1891, pp. 16–18.)

TABLE 3.—*Exhibiting the death rate from Scarlet Fever reported in Michigan, per 100,000 of population, for each of the 24 years, 1868–91. (The data for this table were supplied by C. L. Wilbur, M. D., Chief of Vital Statistics of Michigan, Department of the Secretary of State.)*

Year.	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.
Death rate	8.48	22.09	71.96	56.62	44.83	43.94	32.23	29.99	27.41	26.91	27.74	26.26
Year.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.
Death rate	22.66	22.82	34.25	37.94	17.91	13.13	16.69	16.25	16.13	11.72	10.60	18.70

Reported Deaths from Scarlet fever in Michigan, 24 Years, 1868-91.

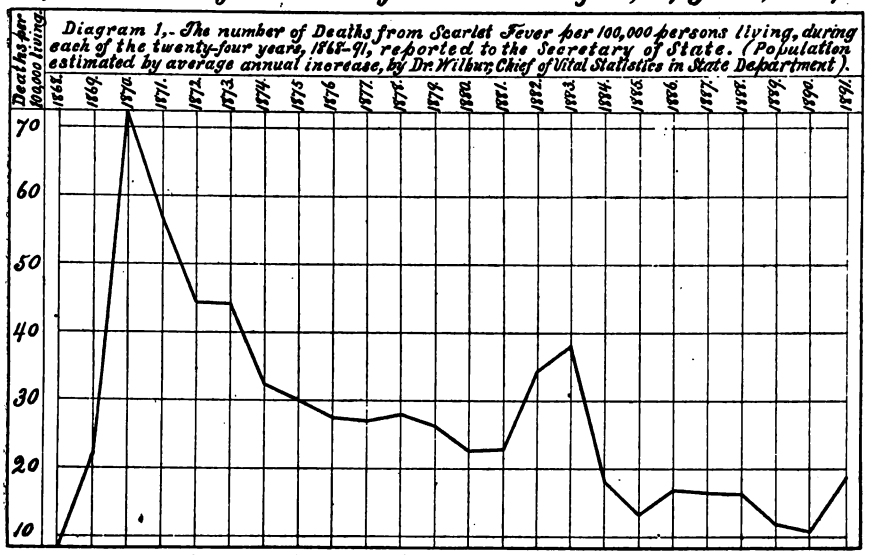


Diagram 1,- The number of Deaths from Scarlet Fever per 100,000 persons living, during each of the twenty-four years, 1868-91, reported to the Secretary of State. (Population estimated by average annual increase, by Dr. Wilbur, Chief of Vital Statistics in State Department).

Diagram 1, graphically represents Table 3 which supplies the figures in detail.

SCARLET FEVER IN MICHIGAN IN 1891 COMPARED WITH PREVIOUS YEARS.

TABLE 4.—*Exhibiting the number of outbreaks, cases and deaths from Scarlet Fever, together with the average number of cases and deaths per outbreak, and the per cent of cases which proved fatal, reported to the office of the State Board of Health for each of the ten years, 1882-91.*

Year.	Reported Outbreaks.	Reported Localities.	Reported Cases.	Av. No. of Cases per Outbreak.	Reported Deaths.	Av. No. of Deaths per Outbreak.	Deaths per 100 Cases.
1882	----------	83	849	----------	138	----------	*16
1883†	164	150	1,802	11.	248	1.51	*14
1884‡	324	296	2,476	8.	230	.71	9
1885	356	337	2,750	8.	187	.53	7
1886	336	302	3,046	8.28	275	.71	9
1887	353	297	3,400	9.63	314	.89	9
1888	331	315	2,989	7.85	200	.52	6.7
1889	421	382	3,535	8.40	166	.39	4.6
1890	481	417	3,835	7.97	162	.34	4.2
1891	605	516	6,212	10.27	286	.47	4.6

* Probably in some instances only the fatal cases were reported.
† Use of the blank form "M" for weekly reports was begun in May, 1883.
‡ Use of the annual reports of health officers in compiling scarlet fever for the communicable disease article was begun in 1884.

TABLE 5.—*Exhibiting the number of reported outbreaks of Scarlet Fever in Michigan during the years 1890 and 1891, with the number of localities in which it occurred, the number of cases and deaths, the average number of cases and deaths per outbreak, deaths per hundred cases, in each year, with the departure of the same for 1891, from 1890, and from the average of the same for the 7 years, 1884-90.*

Year.	Reported Outbreaks.	Reported Localities.	Reported Cases.	Av. No. of Cases per Outbreak.	Reported Deaths.	Av. No. of Deaths per Outbreak.	Deaths per 100 cases.
1890	481	417	3,835	7.97	162	.34	4.2
Average for seven years, 1884-1890	386	335	3,147	8.30	219	.58	7.1
1891	605	516	6,212	10.27	286	.47	4.6
Departure of 1891 from 1890	+124	+99	+2,377	+2.30	+124	+.13	+.4
Departure of 1891 from the average for 7 years, 1884-90.	+219	+181	+3,065	+1.97	+67	—.11	—2.5

Tables 3, 4 and 5, and Diagram I, exhibit the reported prevalence of scarlet fever in 1891, compared with previous years. Table 3 gives, for each of a series of 24 years, 1868–1891, the death-rate from scarlet fever reported to the Secretary of State, per 100,000 of population, (computed in the office of the Chief of Vital Statistics, Department of State). Table 4 shows, relative to this disease, in each of the ten years, 1882–91, the numbers of outbreaks, cases and deaths which were reported to the office of the Secretary of this Board, with the average numbers of cases and deaths per outbreak, and the per cent of cases which proved fatal. In Table 5 a comparison of the data relative to 1891 with those for 1890, and with the averages of those for the seven years, 1884–1890, is made. These tables, Nos. 3, 4 and 5, show a large increase of scarlet fever in Michigan in 1891, as compared with previous years. It may be seen by reference to Table 5, that there were reported 124 more outbreaks, 2,377 more cases and 124 more deaths from scarlet fever in 1891 than in 1890; and 219 more outbreaks, 3,065 more cases and 67 more deaths in 1891, than the average reported outbreaks, cases and deaths for the seven years, 1884–90.

Much of the reported increase in prevalence of scarlet fever in 1891 over 1890, is no doubt due to the steadily improving methods of the State Board of Health of obtaining reports relative to communicable diseases; to increase of population; greater assiduity of health officials, practicing physicians, householders and the people generally, in reporting presence of the disease; and to the occurrence of epidemics in several localities; but the combined influence of these factors is not, probably, sufficient to account entirely for the large increase in the disease shown in 1891. It seems probable that the increase noted was largely due to an epidemic wave of the disease which passed over this and other States during that year; for, reference to the vital statistics of Ohio, Indiana, Minnesota, Massachusetts, New Jersey, and New York, shows that the death-rates from scarlet fever in those States were very much higher in 1891 than in 1890.

MEASURES TAKEN TO RESTRICT SCARLET FEVER.

The following extracts from reports made to this Office, are representative statements of the efforts made by local health officials to restrict scarlet fever.

Relative to scarlet fever in the village of Almont, Lapeer county, Dr. Adam Price of that village, wrote:

"Scarlet fever cases have been handled in the following manner: When possible, the patient and nurses were separated from the rest of the family; but whether they were or not, the house has in every case been thoroughly quarantined. No person from the house being allowed off the place, and no person allowed to visit the house. Every day some person hired for the purpose, goes to the gate, and receives orders for anything required for the house, and gets what is necessary, delivering it at the gate or door. This method has proved perfectly successful. No case has during that time exposed any other. So during all that time, while there have been several outbreaks, in no case has the disease spread from one house to another. We have usually been exposed by some family outside the corporation having it sending children to school without their house or clothing being properly disinfected; and we are now in serious danger from a family just outside the corporation that had scarlet fever in November. Their house has, as near as I can learn, never been properly attended to. I tried to have the township officers instruct their health officer to attend to it; but they would not. In a few cases of diphtheria they have allowed their health officer to quarantine and disinfect; and he has had perfect success in preventing the spread of the disease. Now the question occurs to me, am I doing right by the people of this village in quarantining as thoroughly as I do? If a business man has scarlet fever in his family, he has to go away and board or leave his business and stay at home. If others around us would do as we are doing, all would be well; but for us to be so careful and others to let it go, seems wrong."

Relative to an outbreak of scarlet fever in Benzonia township, Benzie county, Dr. W. B. Mott reported as follows:

"The first case was reported to this office the 20th of December and immediate steps were taken to isolate the case that it would not spread. The public schools were closed and no communication was allowed between the family and others. The second case was reported the 24th, and the third the 25th of December. I should say that these cases were in two different families, but both live in different houses on the same lot, and were mingled together as one family. Upon the breaking out of these last cases every precaution was taken that no communication was had with outside parties, and when the one died upon the 7th of January, no public funeral was allowed or gathering of the friends and people. Much fault was found in this, but after talking with friends they consented to the wish of the Health Board, and after the funeral all clothing used around the patient that was not worth anything, was burnt up and the balance was hung around so that it would be exposed to the fumes, and then the house was shut up tight and sulphur burnt in the house until every thing was impregnated with sulphur fumes. The other house was fumigated, with clothing, the same; and there has been no new case, and at this time I do not think there will be any more; thus showing that by the prompt action of the Health Board the disease was nipped in the bud. And I think this shows, that, if proper precantion is taken, and the Health Board do their duty, that in country localities, epidemics of diseases can be prevented. I am at a loss what to think about the way it is claimed that the disease was brought here. A man whose family had had the scarlet fever, and had got entirely over the disease, stayed one night with the family in which the first case made its first appearance. It does not seem possible that the virus could retain its vitality for the length of time claimed, and be brought that distance in freezing weather and be propagated."

Relative to an outbreak of scarlet fever in Penn township, Cass county, the health officer, L. Osborn, M. D., wrote:

"Enclosed is my special final report of two cases of scarlatina that occurred in my jurisdiction. I have deferred making my final report before, waiting to see if there would be any more cases in that family, which consists of five small children, the oldest 8 years, the youngest 2 years. One of my patients was 8 years old, the other 7 years old. They were all living together when the two older were taken sick. I separated them from the others as soon as I determined the nature of the disease. Kept them separated from the family until after the peeling off stage. Since then they have all mingled together. There have been no more cases up to this date."

"During the present outbreak of scarlet fever in the township of Butler, Branch county, the total number of cases was eight. No deaths.

"The house and privy, etc., were all disinfected as follows: To each 10 feet square room four pounds of sulphur was burned. All the rules of pamphlet were carried out, as nearly as possible. The outbuildings were disinfected with chloride of lime.

"The source of the contagium is unknown. There has been no spread of the disease.

"I think with proper care and isolation and disinfection, the spread of contagious diseases can be and are prevented to a great extent."—*Dr. J. J. Heator, health officer, Butler township, Branch county.*

"Owing to the somewhat alarming spread of scarlet fever in our city * * * I have advised the board of health to adopt more stringent rules regarding isolation.

"They have suggested that I draw up such rules and present them at some future meeting. Have you any copies of any rules which you think would help me in framing them according to the ideas of the State Board of Health? If so would be much obliged for a copy of them. Please add Reprint No. 130 (The Enforcement of Sanitary Regulations) from Annual Report of 1882."—*Dr. C. Van Zwaluwenburg, health officer, Kalamazoo city, Kalamazoo county.*

VIOLATIONS OF PUBLIC HEALTH LAWS.—RESULTS.

While we learn of many instances of laudable effort on the part of local health officials to prevent and restrict communicable diseases, and of the beneficial results therefrom; it is regretable to note that reports are equally numerous of neglect, and disobedience of the law which provides that restrictive measures shall be adopted in all cases of communicable diseases. Following are a few extracts from letters and reports received at this office, which bear testimony of such neglect and attendant evil results:—

L. F. Stuch, health officer of Allegan village, where there occurred 13 cases of sickness and two deaths from scarlet fever, wrote:—

"I have heard in a roundabout way that they had scarlatina at Mr. Hoffman's, but no report has been made to me by the family or attending physician, * * * and I do not feel it my duty to go and make inquiry. I have also heard in like manner that there was a case of scarlatina in the family of Chas. Bullard of this place, * * * but have not received any report. Nor does either [physician] report their cases of contagious diseases, till asked to, and then in a none-of-your-business way. So I will have to leave it for you to learn the facts in the case as you can."

Dr. S. E. Hooper, health officer of Austin, Sanilac county, reporting relative to scarlet fever, wrote, April 2, 1891, as follows:

"Replying to your favor of the 30th March will say that I think the fever is over; but am sorry to say that I cannot make a very good report. As I told you before, it is very hard to find where the disease has been. I have heard of quite a number of places that I have reason to believe that the disease was, that have not been reported, through ignorance of the people not knowing that it should be reported and also not knowing the disease. I have had about 40 cases in the town of Austin (15 families). Have had no deaths. I placarded the houses, ordered sulphur burned and the clothes boiled, and asked the people to warn people before they came in the house. I have not been personally and burned sulphur in the houses; but if you think it would be advisable, I will do so. I hope I will be able to get our board of health to adopt some good rules at the next meeting. Perhaps you could kindly send us a set of rules suitable for a town like this."

April 25, 1891, Dr. Hooper again wrote to this office as follows:—

"Am sorry to say that I have lost my position as health officer of Austin by trying to mildly enforce the health laws. I tried to make expenses as low as possible on the town during this epidemic. I might say that trying to save expense was one of my reasons for not personally disinfecting the houses. The board forbid my going around to disinfect the places where the fever was as they think it is not necessary. So it will be impossible for me to send in a fuller report than I have. * * * I have no desire for the position. As you know, it is not to a physician's advantage financially to hold the position; but as a citizen would like to see all the sanitary rules carried out properly. * * * Hoping that you will understand that I am with you in the opinion of enforcing the health laws; but circumstances seem against us in Austin."

Chas. Shickle, M. D., health officer of Shiawassee township, Shiawassee county, reported to this Office as follows:

"Regarding those cases of scarlet fever at Watson's, I didn't think it necessary to make any further report until the end of the year and then send in a final report. But enclosed please find full report as requested.

"Now regarding the work of the health officer of this township, it is not necessary for me to tell you that it has been neglected, as you perhaps well know. But perhaps not without some reason. First, they only allow the sum of $5, as compensation for such work. And second, cases are not reported to the health officer by the attending physician. Hence the only intimation we have of existing cases of diseases dangerous to the public health, is, as a rule, floating rumor, and from the laity."

"The local board of health here have handled matters in such a slip-shod way, and we have so many contagious diseases in the village this fall and winter that I propose to have a more perfect organization next year, get some resolutions passed for restriction and prevention, and have the village council take some responsibility. The village Council have never organized a board of health; but there have been so many contagious diseases in the village, they now see the necessity. Any pointer from you in this matter will greatly assist and be thankfully received."—*Dr. D. J. Wallace, health officer, Sparta township, Kent county.*

Failure and Success.

Dr. H. A. Fortuin, health officer of Overisal township, Allegan county, in forwarding to this Office his final report of an outbreak of scarlet fever which occurred in his jurisdiction, and which resulted in 103 cases and 2 deaths, wrote in regard thereto:

"Let me give you a few of the reasons why this epidemic became so extensive. In the first place three-fourths of all the people in the township are inter-related. The epidemic being light, they must of course visit the sick,—being mostly in winter, making this visiting all the more easy on account of leisure time. Secondly, I have the reputation of being too strict upon these points altogether. The people are to a great extent fatalists, and what Providence means to send they will get any way, they say, so I am simply trying to fight Providence. It is my honest opinion that had the law been fully and willingly obeyed the epidemic would not have reached the proportions it did.

"One family of seven children in which it started told me in my first visit that if anything could be done to prevent the others having it, I was at liberty to do anything I wished, and it would be obeyed to the letter. The little patient was immediately isolated with his mother. Everything was done in accordance with instructions from your office and the disease spread no further in that family. Truly very good proof of the efficiency of the measures employed."

Scarlet Fever at Lapeer.

The following extracts from correspondence of this office give the history of an epidemic of scarlet fever, resulting in 100 cases and two deaths, in Lapeer city; and present another instance of the dire effects of neglect of the requirements of the public health laws:—

March 2, 1891, Dr. W. Flagler, health officer of Imlay township, Lapeer county, wrote to the Secretary of this Board as follows:—

"Regard for the law and public safety impels me to inform you that an epidemic of scarlet fever is prevailing and assuming alarming proportions in the city of Lapeer, and *no precautionary* measures are being taken to restrict the spread of the disease.

"Dr. A. H. Thompson * * * is president of the council, and has neglected to appoint a health officer.

"I am credibly informed that there are hundreds of cases within the city limits, and not a placard has been posted. Also that the principal of the public school has had the disease in his family, and has continued his duties without interruption, carrying the contagion right into the school.

"I am not aware that any deaths have occurred as yet.

"We are twelve miles distant; but there is no safety for anyone within the county, if this state of affairs is to be allowed to contine."

On receipt of Dr. Flagler's letter, inasmuch as the city had no health officer, the usual official communication was sent to the mayor of the city asking for reports. A reply not having been received from the mayor, the Secretary wrote to Dr. Hugh McColl, of Lapeer, relative to the subject, who, March 5, 1891, responded as follows:—

"Your letter of inquiry regarding scarlet fever in this place was received today. I have not seen any of the cases called scarlet rash, scarlatina, etc., myself, as I have not been doing general practice since my return, my work being almost confined to the office. From reliable sources I should think that 100 cases would be a moderate estimate of so-called 'scarlet rash,' or other names given. There has been one death only as far as I know; but a number have developed the usual sequelæ, albuminuria, with dropsical swellings. No precautions have been taken, children going to school while peeling. The superintendent attending to all his school duties and nursing his sick children up to the time of school. No notices posted. Our common council have again refused to appoint a health officer. Our mayor, a homeopathic physician, has had reports made to him, I am told, but as he paid no attention to the business these ceased to be made, and as there was no head to the business each physician did as he pleased, and that was to ignore the whole responsibility of isolation and notification. The homeopaths say it is only 'scarlet rash' and not contagious, still the malady spreads. And now there is no possibility of isolation without making a clean sweep of the whole town. One doctor told me today he had treated twenty at least of mild scarlet fever. There will be a general spread to other places in all probability.

"P. S.—I shall send a communication to the council on Monday night."

There seeming to be no prospect of the Lapeer authorities appointing a health officer, or taking other action to arrest the spread of the disease, the following letter was addressed by the Secretary of this Board to the Governor, requesting his intervention in the matter:—

MICHIGAN STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY,
Lansing, Mich., March 7, 1891.

"HON. EDWIN B. WINANS, *Governor of Michigan:*

SIR:—Information reaches this Office that one of the dangerous communicable diseases, namely, scarlet fever, has spread through the city of Lapeer, and it is alleged that there is danger of its spreading to other places, through the disregard of law in the city of Lapeer, not only by the citizens, but by officers sworn to support the constitution of this State and to perform the duties of the office according to the best of their ability.

"I respectfully ask that, under § 654, Howell's Annotated Statutes, you direct that an inquiry be made to ascertain whether there has been such 'wilful neglect of duty' as, under § 658 Howell's Statutes, will warrant the removal from office of the board of health of the city of Lapeer.

"No other board of health being organized in the city of Lapeer, the mayor and aldermen of the city are required by law (§1681 Howell's Statutes) to 'perform all the duties of a board of health.' They are officers 'chosen by the electors' of the city, therefore subject to removal under §658 Howell's Statutes.

"The law, § 1634, Howell's Statutes, requires that 'every board of health shall appoint and constantly have a health officer, and shall immediately cause to be transmitted to the Secretary of the State Board of Health at Lansing, the full name and postoffice address of such health officer.' I have reason to believe that this law has not been complied with.

"That it is a case of 'willful neglect of duty' is shown by the fact that no return of the health officer has been received at this Office, although official demand was made by this Office for a return of the name of the health officer, the demand having been made upon both the mayor and the clerk, April 5, 1890; also on the clerk June 6, and October 18, 1890, and again on the mayor, March 3, 1891; and also by the fact that partly because of the failure of local officers in Lapeer to comply with this law, the State Board of Health accepted an invitation from citizens of Lapeer, and a Sanitary Convention was held there, at which convention the importance of a compliance with the law was publicly discussed.

"It is now reported, not only from Lapeer, but from a locality endangered, that at least one hundred cases of a communicable disease, believed to be scarlet fever, have occurred, and that one death has resulted, and that there is danger of the disease spreading to other localities through the 'wilful neglect of duty' by officers in Lapeer.

"That more cases and deaths from this disease occur in outbreaks which are neglected than in those which are not, has many times (in this Office) been proved beyond any question. This is also evident by the diagram sent herewith, which exhibits the average numbers of cases and deaths from scarlet fever per outbreak in Michigan during the year 1888. The cases already reported in Lapeer are greatly in excess of the average number of cases in 'neglected' outbreaks of scarlet fever. It thus appears that, except for the 'wilful neglect,' many cases in Lapeer should have been prevented.

"The object of this action is not necessarily to cause punishment, but to secure as prompt action as is possible for the execution of the health laws, and the consequent saving of life and health.

"Very respectfully,
"HENRY B. BAKER,
"*Secretary.*"

To this letter from the Secretary, the Governor replied as follows:

"EXECUTIVE OFFICE,
MICHIGAN,
March 9, 1891.

"HENRY B. BAKER, ESQ., *Secretary of the State Board of Health, Lansing, Mich.*

"SIR:—I am in receipt of your letter of the 7th inst., with regard to the existence of scarlet fever in the city of Lapeer and the danger of its extending to other places, and asking me to direct inquiry to be made under section 654 of Howell's Statutes, with a view to the removal from office of the Board of Health of the city of Lapeer.

"Section 653, to which you refer, after specifying the local officers subject to removal by the governor, provides as follows:

"'But the governor shall take no action upon any such charges made to him against any such officer until the same shall have been exhibited to him in writing, verified by the affidavit of the party making them that he believes the charges to be true, with a statement of the prosecuting attorney of the county that, in his opinion, the case demands investigation.'

"Inasmuch as this section expressly forbids the governor to take action unless these conditions shall have been complied with, I could not take the action you ask without clearly exceeding my authority.

"Very respectfully,
"EDWIN B. WINANS, *Governor.*"

On receipt of the Governor's letter, the Secretary wrote to Hon. W. W. Stickney, Prosecuting Attorney of Lapeer county, as follows:—

"DEAR SIR:—Herewith, I send a copy of a letter to the Governor relative to scarlet fever in Lapeer and the alleged great danger of its spread to other places. A similar copy has been sent to the mayor of the city of Lapeer, with the last paragraph marked, to call attention to the fact that, what is desired is to secure as prompt action as possible for the execution of the health laws and the restriction of the disease. I suppose it is possible, that prompt action may now be taken by the local board of health; but §653 Howell's Statutes states that, the Governor can take no action without 'a statement of the prosecuting attorney of the county that, in his opinion, the case demands investigation.'

"I write to ask whether in your opinion 'the case demands investigation.' *The letter to the Governor sets forth the facts as I understand them. The information is conclusive to my mind that scarlet fever is present in Lapeer. That is an additional reason why the health laws should be complied with. I shall be grateful for any facts or suggestions which you send me which will aid in reaching the object in view."

"* In case it *does* 'demand investigation' will you have the kindness to send me such a statement as I can put before the Governor?"

Not having received an answer from Mr. Stickney, to the preceding letter, the Secretary again wrote to that gentleman, March 28, 1891, as follows:—

"DEAR SIR:—On March 9 I wrote to you concerning the alleged outbreak and unrestricted spread of scarlet fever in the city of Lapeer, enclosing a copy of my letter on the same subject to the Governor, and asking that, if in your opinion the case 'demands investigation,' you would kindly send me such a statement as I could put before the Governor, but as yet I have received no reply.

"My letter expressed the view that punishment is not desirable, but that compliance with the laws is.

"I had hoped to hear from you that a health officer was appointed, and that vigorous efforts were being made to stop the spread of the disease.

"I shall be glad to hear from you on the subject. Enclosed please find stamped envelope."

Following is Mr. Stickney's response (dated March 30, 1891) to the Secretary's letters:—

"DEAR SIR:—Yours received and I received the one written under date of March 9, and in due time sent my answer to it to Governor Winans.

"After a careful investigation of the matter my conclusion was that there was no necessity for an official investigation. I did call the attention of the Mayor to the matter of an independent board of health here; but have not pressed it, thinking that it would be better to wait until after election. The present board would vote, I think, against any and all propositions looking to the establishment of a local board of health.

"I think there has been neglect of duty during the past winter; but fortunately no deaths have occurred in consequence of it. As I understand from some of the physicians, that no deaths occurred from scarlet rash.

"On the incoming of the new council I will call their attention to the law and advise them to appoint a board of health."

March 30, 1891, Dr. Hugh McColl again wrote to the Secretary, as follows:

"DEAR SIR:—I am sorry to have to inform you that no health officer has been appointed here yet. There are some cases of scarlet fever, but how many, I am unable to say, as I have not been able to see but a few of the doctors today, being away the greater part of the day. I shall send you an estimate in a day or two. No deaths since last letter (There were 2 deaths altogether)."

May 2, 1891, the Secretary again wrote to Hon. William W. Stickney, as follows:

"DEAR SIR:—Referring to your letter of March 30, in reply to mine relative to a plain violation of the law by the council of Lapeer, in not appointing a health officer.—You say that after election you will call the attention of the new council 'to the law and advise them to appoint a board of health.' I understand the election has occurred. No return of the name of the health officer has been received at this Office from Lapeer, as the law requires. I am instructed by the State Board of Health to follow up this case of violation of law with a view to securing compliance, and to prevent any more unnecessary sickness and deaths from occurring there. Since my last letter to you, one more death has occurred in Lapeer from a preventable disease—diphtheria, and April 24, Dr. Hathaway reported one case of diphtheria convalescing, and one or two of scarlet fever in light form. It is *such* cases that spread such dangerous diseases, because not so much care is taken as with those more serious in their appearance.

"Your letter speaks of the appointment of a 'board of health.' That may be desirable, but it is not required by law,* and I think it is not so important as the appointment of a health officer, which is required by law.

"I noticed that, the other time, you sent your reply to the Governor; but the Governor could not act on your report alone. He requires the affidavit of some person that they believe the law has been disregarded. If you will send me the report or let me know that you have sent it to the Governor, and that it is a proper case for investigation, I will make the charges in writing and verify them by affidavit for presentation to the Governor, or, if you prefer, I will make out the charges and affidavit and send to you, and you can send them with your report to the Governor.

"The law, § 1684 Howell's Statutes, allows 30 days after the township meeting for the board of health to meet and appoint a health officer. I presume it would be well to wait until the 30 days have expired? But inasmuch as there is no health officer whose term would hold over, and as there are two of the most dangerous diseases present in Lapeer, it seems to me that there should be no unnecessary delay.

"I hope to hear from you on this important subject."

"* § 1681, Howell's Statutes requires 'The Mayor and aldermen of each incorporated city'—'shall have and exercise all the powers *and perform all the duties of a board of health.*'"

In reply to the Secretary's letter of May 2, 1891, Mr. Stickney wrote, May 7, 1891:

"MY DEAR SIR:—In answer to yours of May 3rd, I have to report; the council at its meeting on Monday evening, May 4th, appointed Dr. William Blake, of Lapeer. I think the appointment is a good one if the Dr. is aggressive enough.

"I trust in the future those whose duty it is to see to the matter of the public health will appreciate the importance of thorough and timely work in preventing the spread of contagious diseases."

PRACTICAL RESULTS IN RESTRICTING SCARLET FEVER.

In studying the effects of efforts of health officers for the restriction and prevention of scarlet fever, and of the difficulties experienced by some of them in carrying out the methods recommended by the State Board of Health to that end; it is interesting to note the difference in the reported numbers of cases of sickness and of deaths, from this disease, in outbreaks where local health officers were enabled to enforce isolation and disinfection, and in those outbreaks in which, for any reason, those restrictive measures were neglected. Tables 6 and 7 and accompanying Diagram afford data for comparison of the results attending the adoption, and neglect, of preventive and restrictive measures in outbreaks of scarlet fever in Michigan in 1891 and previous years.*

By Table 7 it may be seen that, during the six years, 1886–91, there were, on the average, over five times as many cases and over four times as many deaths in those outbreaks where these measures were neglected as in those outbreaks where they were enforced.

By Table 6 it may be seen that during the year 1891 there were reported to the office of the State Board of Health 602† outbreaks of scarlet fever with 4,936 cases and 193 deaths. Had no efforts at restriction been made, and had the average numbers of cases and deaths per outbreak remained the same as in the column headed "Isolation and disinfection both neglected," there would have occurred 7,278 cases and 283 deaths, and taking from these respectively the cases (4,936) and deaths (193) which did occur, leaves 2,342 cases and 90 deaths indicated as prevented in these 602 outbreaks, by isolation and disinfection. By the same method, the indicated saving in the 2,459 outbreaks which occurred, during the 6 years, 1886–91, is 16,418 cases and 792 lives.

The above indicates only the lives saved and cases prevented in localities *after outbreaks had commenced.* There was also a large saving in the

* In the compilation of the reports for Tables 6 and 7 and the diagram showing the results obtained by isolation and disinfection, every effort has been made to place the numbers of cases and deaths in each outbreak in the proper columns. If, for instance, there were only one or two cases in an outbreak and the health officer neglected to isolate or disinfect, but for some reason the disease spread no further, the number of cases and deaths were placed in the column headed "Isolation and Disinfection both Neglected." If, on the other hand, as often occurs, quite a number of persons are exposed at the same time and place outside the health officer's jurisdiction, and by proper isolation and disinfection he succeeds in confining the disease to the original cases exposed, they are placed in the column headed, "Isolation and Disinfection Enforced." If, however, he neglects to properly isolate or disinfect, the whole number of these cases and deaths are placed in the "neglected" column. It is to be regretted that many of the reports received at this office do not state exactly what was done to restrict the disease, or are not sufficiently definite to enable the compilers to decide just what was done, and they are obliged to place all such in the column headed "Isolation or Disinfection or both not mentioned, or statements doubtful."

† Whenever a break of 60 days or more has occurred in the progress of scarlet fever in a given township, village or city, it has hitherto been regarded as two different outbreaks, but in estimating outbreaks for these tables, 6 and 7, and the corresponding tables for diphtheria, if the second appearance of the disease originated from the first the intermission was disregarded and it was treated as a single outbreak. Also, comparisons of *years* require that outbreaks be counted as closed at the close of the *year;* while in comparing *outbreaks* for testing the value of isolation and disinfection it is necessary to take *complete outbreaks,* even where they extend from one year into the next. This explains the apparent discrepancy between the number of outbreaks here given and the number given at the beginning of this article.

number of outbreaks in Michigan, for the reason that isolation and disinfection by preventing scarlet fever from spreading in localities where it already existed, probably in the same proportion prevented the disease from spreading from those localities and starting outbreaks in other localities. In this way, it is believed that the *number of outbreaks* in Michigan during 1891 was restricted in about the same proportion as the *number of cases* in all outbreaks was restricted; that is, about 32 per cent, or 283 outbreaks were prevented. Assuming that in these 283 outbreaks the average numbers of cases and deaths per outbreak would have been the same as they averaged in those outbreaks where isolation and disinfection were neglected, there is indicated an additional saving of 133 lives and 3,421 cases by isolation and disinfection during 1891, making the total indicated saving for the year 223 lives and 5,763 cases. By the same method there is indicated a total saving during the 6 years, 1886–91, of 2,258 lives and 48,996 cases, by the measures prescribed by the Michigan State Board of Health,—an average saving of 376 lives and 8,166 cases per annum during the 6 years.

The probable annual saving of these 8,166 cases of sickness and 376 deaths from scarlet fever, in Michigan, whether viewed from a humane or economic standpoint, is cause for gratulation in the State. For, the avoidance of the pain and sorrow which so much sickness and death would have entailed, and the money loss which the State would have been called upon to sustain* (if human life can be measured by pecuniary equivalent) is matter for pleasurable reflection.

* Based on previous estimates ($500.00 per human life, $40.00 as expense of each funeral and $20.00 as medical and other expenses in each case of sickness) the money loss thus avoided is $366,360.

TABLE 6.—*Scarlet Fever in Michigan in 1891, Exhibiting the Average Numbers of Cases and Deaths per outbreak:—(1) in all the 602 outbreaks reported, (2) in the 380 outbreaks in which it is doubtful whether or not Disinfection or Isolation was secured, (3) in the 24 outbreaks in which Isolation was neglected, and Disinfection was enforced or doubtful, (4) in the 27 outbreaks in which Disinfection was neglected and Isolation was enforced or doubtful, (5) in the 52 outbreaks in which Isolation was enforced and Disinfection was neglected or doubtful, (6) in the 14 outbreaks in which Disinfection was enforced and Isolation was neglected or doubtful, (7) in the 141 outbreaks in which both Isolation and Disinfection were neglected, (8) in the 42 outbreaks in which both Isolation and Disinfection were enforced, and (9) in the 192 outbreaks in which Isolation or Disinfection or both were neglected.*

	(1) All Outbreaks.* (602 outbreaks.)		(2) Isolation or Disinfection or both not mentioned, or statements doubtful. (380 outbreaks.)		(3) Isolation Neglected, Disinfection enforced or doubtful. (24 outbreaks.)		(4) Disinfection Neglected, Isolation enforced or doubtful. (27 outbreaks.)		(5) Isolation Enforced, Disinfection neglected or doubtful. (52 outbreaks.)		(6) Disinfection Enforced, Isolation neglected or doubtful. (14 outbreaks.)		(7) Isolation and Disinfection both neglected. (141 outbreaks.)		(8) Isolation and Disinfection both enforced. (42 outbreaks.)		(9) Isolation or Disinfection or both Neglected. (192 outbreaks.)	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Totals.....	4,936	193	3,012	91	91	6	77	0	124	5	54	5	1,704	66	107	1	1,872	72
Averages	8.20	0.32	7.93	0.24	3.79	0.25	2.85	0	2.58	0.10	3.86	0.36	12.09	0.47	2.55	0.02	9.75	0.38

* These do not include the cases in Detroit and Grand Rapids (because of the difficulty in determining the beginning and ending of an outbreak in these cities, in which the disease is present in some part of the city nearly all the time), nor the cases in Muskegon City, from which city were reported 98 cases, and in reporting which the health officer stated he did not know how many deaths had occurred.

TABLE 7.—*Exhibiting for the six Years, and for each of the six Years, 1886-91, the Numbers of reported Outbreaks, Cases and Deaths; also for this six-year Period, the average Numbers of Cases and Deaths per Outbreak in all Outbreaks; in those Outbreaks in which Isolation or Disinfection or both were Doubtful; Isolation or Disinfection Neglected; Isolation and Disinfection both Neglected; Isolation and Disinfection both Enforced; and, also, the numbers of Cases and Deaths Indicated as having been prevented by Isolation and Disinfection.*

Years.	All outbreaks.*			Isolation or Disinfection, or both, not Mentioned, or Statements Doubtful.			Isolation or Disinfection or both Neglected.			Isolation *and* Disinfection, both Neglected.			Isolation and Disinfection, both Enforced.			Cases and Deaths Indicated as having been prevented by Isolat'n and Disinfection.	
	Out-breaks.	Cases.	Deaths.	Out-breaks.	Cases.	Deaths.	Out-breaks.	Cases.	Deaths.	Out-breaks.	Cases.	Deaths.	Out-breaks.	Cases.	Deaths.	Cases.	Deaths.
1886	324	1,716	100	221	934	43	45	623	46	†	†	†	58	159	11	‡ 2,768	‡ 231
1887	299	1,882	141	190	1,200	93	45	534	37	32	440	34	64	148	11	§ 2,220	§ 177
1888	340	1,838	112	225	955	74	83	819	39	61	724	33	36	80	3	§ 2,198	§ 72
1889	417	2,832	123	284	1,453	61	87	1,290	54	72	1,208	48	52	140	10	§ 4,175	§ 156
1890	477	3,054	115	302	1,711	67	136	1,287	48	94	1,137	36	42	76	1	§ 2,715	§ 66
1891	602	4,936	193	380	3,012	91	192	1,872	72	141	1,704	66	42	107	1	§ 2,342	§ 90
Totals	2,459	16,248	784	1,602	9,265	429	588	6,425	296	400	5,213	217	294	710	37	16,418	792
Averages, six years	410	2,708	131	267	1,544	71	98	1,071	49	‖ 80	‖ 1,043	‖ 43	49	118	6	.....	.....
Av. cases and deaths per outbreak	.....	6.60	0.32	.....	5.78	0.27	.....	10.93	0.50	.....	¶ 3.04	¶ 0.54	.....	2.41	0.12	.....	.....

* Outbreaks in Detroit, Muskegon and Grand Rapids not included.

† Compilations for this column were first made in the year 1887.

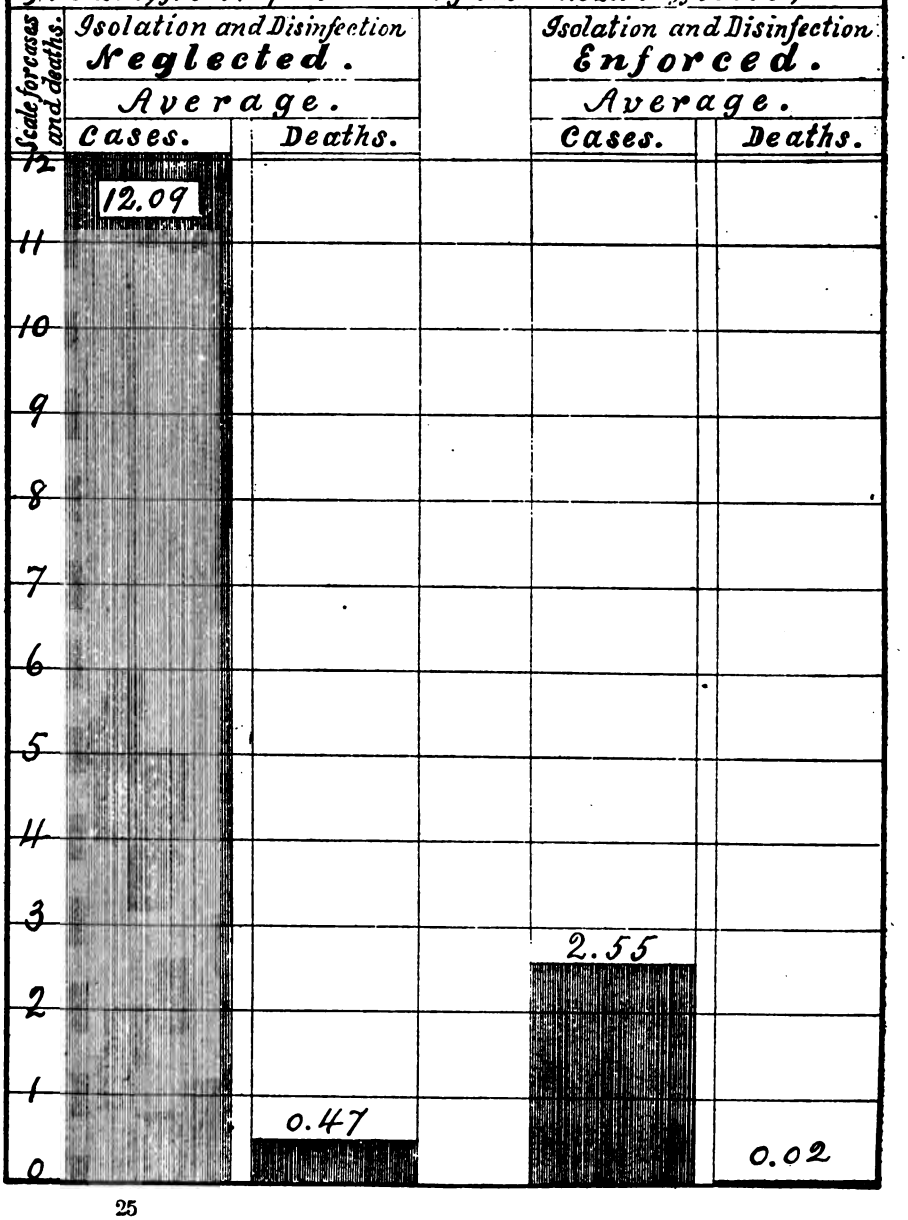
‡ These results are obtained by multiplying the total number of outbreaks for the year by the average number of cases (13.84) or deaths (1.02) per outbreak, which is obtained from the column "Isolation *or* Disinfection or both Neglected," and deducting from the results thus obtained the number of cases and deaths which *did* occur in the year 1886.

§ These results are obtained in the same manner as noted in the last foot note above, except that the averages by which the whole number of outbreaks for each year is multiplied, are obtained from the column "Isolation *and* Disinfection both Neglected."

‖ Average for five years 1887-91.

¶ Averages, cases and deaths, per outbreak for the five years, 1887-91.

Scarlet Fever in Michigan in 1891:- Exhibiting the Average numbers of cases and deaths per outbreak:- in all outbreaks in which Isolation and Disinfection were both Neglected; and in all outbreaks in which both were Enforced. (Compiled in the office of the Secretary of the State Board of Health, from reports made by local health officers.)



SOURCE OF CONTAGIUM OF SCARLET FEVER, AND HOW IT IS SPREAD.

Of the 605 outbreaks of scarlet fever reported during the year 1891, as exhibited in the following table, the local health officers reported the source of contagium as follows:—Traced to a former case, 117; probably to a former case, 48; meteorological conditions, 1; alleged unsanitary conditions, 6: carried in carpets and clothing, 8; unknown, 244; and for 181 outbreaks the source of contagium was not stated.

Reported Source of Contagium of Outbreaks of Scarlet Fever in 1891.	Outbreaks.
Traced to a former case	*117
Probably to a former case	48
Meteorological conditions	1
Alleged unsanitary conditions	6
Carried in carpets and clothing	8
Unknown (including "Exposure," "Contagium," "Endemic" and "Sporadic"	244
Not reported or reports not definite	181
All outbreaks	605

* Of the total reported cases for the year (6,212) 902 were traced to former cases.

Traced to a former case.

The following are extracts from the reports of local health officers who were able to trace the disease to a former case, with the name of the health officer and of his jurisdiction subjoined.

"An uncle of the children came from Detroit and slept with one of the children. They had the disease in his house previously."—*Dr. J. C. Flynn, health officer, Warren township, Macomb county.*

"By a family coming into our village who had been previously exposed."—*Dr. Wm. H. Fulton, health officer, Akron township, Tuscola county.*

"The return into the neighborhood of a child from Missisippi during desquamation."—*Dr. Edwin Stewart, health officer, Mendon township, St. Joseph county.*

"Miss Mae Warren is very sick with what Dr. Alden pronounces Scarlatina. She was taken sick in school. Miss Rich (teacher) boards at Mr. Warren's, and now two children are very sick with the same disease. I think the school should be closed."—*John Kinney, Supervisor, Ensley township, Newaygo county.*

"I beg leave to report two cases of scarlet fever—Rosie Lieblein, 7 years, Hancock township, reported August 16, at 10 P. M. The child has been on a visit of 8 days to her grand parents at Calumet, where scarlet fever has been in the same house within a year—house fumigated, etc.—Came back from Calumet Sunday with rash out.

"Baby McCormick, 3 years old, Hancock township—Father worked last week Tuesday for 4 hours, painting a house in which scarlet fever was reported that day, claims he did not enter the house nor come in contact with patient? Rash out two days ago."—*J. E. Scallon, health officer, Hancock township, Houghton county.*

How Scarlet Fever is Spread.

The following extracts from reports received at this Office, from local health officials and others, relative to scarlet fever, bear on the mode of the introduction and spread of this disease in the State during the year 1891:

"Last week I had written out my final report, as I supposed, of scarlet fever, when I was notified of another case. The circumstances surrounding this case are curious and instructive. Two sisters, living three-fourths of a mile from the hotel where they were employed as help, and at which house the first case was taken sick, April 5, appear to have carried the disease home with them. One of these was employed as nurse for the patient at the hotel. It appears that before the child recovered, about the 12th day, the nurse was taken sick with sore throat and fever. There was no eruption on body or in throat. Two days later she was reported by her physician clear from fever, tested by thermometer, well enough to go home. I saw her and consented. Then same doctor reported no sign of scarlet fever. Two weeks later the other sister went home sick with fever and angina. Another physician * * *, was called, could not say whether it was scarlet fever or not, but kept the children at home. But every one of the family were ill and about all had sore throat. Finally the last one of a dozen persons is now having scarlet fever with a full rash. Of course now the house is quarantined, and all precautions taken to prevent the further spread of the disease. We find now that our instructions to the hotel family were not strictly carried out."—*Dr. Edwin Stewart, health officer, Mendon village, St. Joseph county.*

"There is a great deal of fault found here with the Health physician. There is a case of scarlet fever here and the father of the child is assistant postmaster. The postoffice opens out of their sitting room. The father and mother both are caring for this child and tending to the mail. Are out and in at their pleasure. He has a drug store which he also tends to. You will please be so kind as to inform me whether this gentleman is doing right or not in coming out of a room where there is scarlet fever and passing out mail to every one, both large and small."—*Mrs. F. Bender, Ceresco, Calhoun county.*

"There is a case of scarlet fever in the township of Hudson, in the family of Mr. George Gage. The patient, a boy about twelve years old, has been but a few miles from home for months, and no cases of scarlet fever have been in this vicinity for at least five (5) months, to the best of my knowledge.

"During the spring (of '91) one of his schoolmates came to school (one day) while peeling, after an attack of scarlet fever. The child was sent home and the schoolhouse has not been disinfected.

"A large proportion of the children in that district suffered attacks of the disease during the last winter and spring. I attended six of the cases.

"The director of the school is Mr. William Kesslar, Clayton, Mich.

"Will you please make such suggestions as you think advisable? Please communicate directly with the director, to save time, as I wish to stop further spread of the disease."—*Dr. E. J. C. Ellis, health officer, Clayton village, Lenawee county.*

"I enclose weekly report. No new cases have occurred, outside of families already infected, for three weeks and all but one well along on road to recovery.

"As to the August 18, outbreak, I think they have all originated from the same source; but have not positive evidence. But had intended to report all as of the same.

"First case of this series of cases originated from a young girl going to service in a family who had scarlet fever last winter. She did the washing, and in a few days came down with sore throat and a slight eruption. In four days after her return home the other children in the family were taken sick with scarlet fever.

"A little boy living with the grandparents of the above family was infected by the children of this family going over to their grandparents' who lived only a few rods away. His father came and nursed him through the attack which was very severe. Before leaving for home he washed his person in a solution of carbolic acid of the strength of 2 oz. to the gallon, changed his clothes, even to his hat and shoes. In four days from the return home his family commenced to be sick with scarlet fever. I make this statement not supposing there is anything new in it; but it emphasizes the two facts, that the poison will remain for an indefinite time in clothing, and that it is difficult to secure the disinfection of a person who has been in contact with the poison."—*Dr. Wm. H. Fulton, health officer, Akron township, Tuscola county.*

"I was notified today by Dr. T. M. Benedict (the attending physician) of the cases of scarlet fever herein reported, and paid an official visit to the premises, which are located about 20 rods from the district school house. The teacher boarded at the place where the fever broke out; but has been turned away, and also a young lady who attended school. The doctor thinks there is no danger to the school, but I shall watch this case with interest, on account of the school being so near, and the teacher having boarded there, etc., and if another case occurs I shall endeavor to close the school."—*Geo. W. Gravell, health officer, Eureka township, Montcalm county.*

"There is scarlet fever in our village. Yet the physicians seem not to agree about it. There is no isolation. One case, the first, was pronounced to be measles, although the patient, an adult, had had measles before. Now the patient bloats and the skin is peeling. In a family of children, their home opposite the first case, the disease was pronounced a relapse of the measles(!) which the children had recently. In the case of another child, members of the family attend public gatherings. The disease is sometimes men-

tioned as 'scarlet rash' and said to be not scarlet fever. Our union school has been closed this week, and a series of meetings which had been announced by our M. E. pastor has been postponed. Is there no means by which protection can be secured, from this terrible disease? I have three children in my home, and all around are friends with infants and children in their homes. If one or more physicians say it is not scarlet fever, the disease may be allowed to be carried without any restriction.

"Please send me ten or more copies of 'Restriction and prevention of scarlet fever,' and the leaflet 'Contagious Diseases.'

"It is probable that the school will resume its session next Monday. I regret the onslaught that is making on the Board of Health; but believe that intelligence and progress will win in the fight."—*A. T. Waterman, Pastor Congregational Church, Bancroft, Shiawassee county.*

Scarlet Fever carried in Clothing.

In the following instances, articles of clothing were believed to have been the medium of transmission of the disease:

"Came from Denver, Col., from things packed in a trunk, from report, the family had it where the trunk was packed."—*Dr. W. Bates, health officer, Ransom township, Hillsdale county.*

"A case occurred in the house one year ago. The children had been playing with some playthings and an old hat left at that time."—*Dr. L. F. Rice, health officer, Dansville, Ingham county.*

Contagium carried by a Dog.

The writer of the following letter attributes the spread of scarlet fever, in one instance to a dog:

"In reply to yours of the 25th inst., about the outbreak of scarlet fever in this village, and my final report of the same.

"The name of the parties who brought the disease to this place from Lansing, was J. H. Burnett, optician, No. 732 Lapeer St. W. Himself and family, consisting of wife and child, came to visit his sister a Mrs. Charles Bettis, who lives one-half mile out of this village. Date of visit, just before the holidays, and while there they came down with the fever, communicating it to wife and child of Mr. Bettis, who some months after came to a party in this place, communicating the disease to child of T. J. Pomroy, from whom it was carried to a child just across the street by a large and shaggy Newfoundland dog, with which the Pomroy child had been playing."—*Dr. O. Smith, health officer, Lisbon village, Ottawa county.*

Infected by Riding in a Baby-Carriage.

Statements in the following letters seem to indicate that in one instance contagium of scarlet fever was communicated by the use of the baby-cab referred to:

"On yesterday I learned that a little girl, two years, had a 'breaking out' three or four days after having measles. The parents thought she was not sick enough to call a doctor and supposed it (the eruption) to be due to the measles. Some two or three weeks afterwards the mother borrowed a cab from a family by the name of Wilson, in which she wheeled the little girl. Shortly after the cab was returned home, Wilson's baby was fretful with what they took to be a 'heat breaking out.' The first child of the three present cases lives across the road from the two year old who is supposed to have had a 'breaking out of measles' for the second time. The second case of present epidemic lives next door to the little babe whose cab was loaned and who had the 'heat breaking out.' The third case reported is an 8 year old sister of this same babe. We are now keeping the family within bounds.

"Both children who had the mysterious breaking out are still peeling and the first family had had scarlatina several weeks before baby broke out."

"The three cases of some time since are fully recovered and houses, clothing and persons disinfected as directed. The two children now sick were not near those who have been sick; but the woman of whom I wrote, who borrowed the baby cab for her baby, who was sick with the fever, visits at one of the places."—*Dr. F. A. Towsley, health officer, Midland City, Midland county.*

TABLE 8.—*First, second and third localities, where the second locality was infected with scarlet fever from the first, and the third was infected from the second; and the numbers of cases and deaths from scarlet fever in the first, second and third localities. (Compiled from reports of health officers who were able to trace the source of contagium to other localities.)*

Primary Localities from which Scarlet Fever Spread.	In First Locality.		Secondary Localities infected from Primary.	In Second Locality.		Tertiary Localities infected from Secondary.	In Third Locality.	
	Cases.	Deaths.		Cases.	Deaths.		Cases.	Deaths.
Allegan county: Hopkins township	4	0	Allegan county: Allegan village	2	0			
Allegan county: Saugatuck township	*		Allegan county: Manlius township	5	0	Grand Traverse Co.: Fife Lake township	8	2
Antrim county: Mancelona village	1	0	Grand Traverse county: Fife Lake village	30	0	Kalkaska county: Springfield township	8	0
			Kalkaska county: Boardman township	12	2			
			Livingston county: Deerfield township	5	0			
Bay county: Bay City	68	1	Genesee county: Mt. Morris village	15	0			
Berrien county: Chickaming township	*		Oceana county: Hart township	8	0			
Branch county; Bronson village	*		Branch county: Coldwater city	8	2	Branch county: Batavia township	2	0
Clinton county: Elsie village	16	0	Clinton county: Greenbush township	4	0			
Eaton county: Charlotte city	3	0	Calhoun county: Emmet township	1	0			
Eaton county	*		Clinton county: Eagle township	3	0	Ionia county: Danby township	3	0
Genesee county: Fenton village	3	0	Livingston county: Tyrone township	1	0	Genesee county: Argentine township	1	0
			Kent county: Tyrone township	14	2			
Genesee county: Munday township	*		Genesee county: Clayton township	2	0			
Genesee county: Flint city	2	0	Shiawassee county: Morrice village	4	0			
			Venice township	2	0			
Genesee county: Flushing township	1	0	Genesee county: Clayton township	1	0			
Grand Traverse county: Monroe Centre	*		Grand Traverse county: Kingsley village	3	0			
Grand Traverse county: Traverse City	*		Grand Traverse county: Paradise township	2	0			
Hillsdale county: Pittsford township	*		Hillsdale county: Ransom township	3	0			
Hillsdale county: Reading village	*		Hillsdale county: Camden township	60	2			
Houghton county: Calumet village	18	1	Keweenaw county: Sherman township	4	0			
			Sherman township	17	0			

* This outbreak was not reported to this office by the Health Officer of the "first" locality at the time it occurred.

TABLE 8.—CONTINUED.

Primary Localities from which Scarlet Fever Spread.	In First Locality.		Secondary Localities infected from Primary.	In Second Locality.		Tertiary Localities infected from Secondary.	In Third Locality.	
	Cases.	Deaths.		Cases.	Deaths.		Cases.	Deaths.
Houghton county: Calumet township	360	13	Houghton county: Hancock village	17	0			
			Hancock township	17	4			
Huron county	*		Sanilac county: Elk township	5	1			
Ingham county: Lansing city	10	0	Lenawee county: Adrian city	8	0			
			Montcalm county: Edmore village	1	0			
			Ottawa county: Lisbon village	2	0			
Ingham county: Dansville village	4	1	Ingham county: Ingham township	1	0			
Isabella county: Mt. Pleasant city	*		Isabella county: Isabella township	15	0			
Kalamazoo county	*		Branch county: Coldwater township	2	0			
Kalamazoo county: Pavilion township	2	0	Kalamazoo county: Climax township	8	0			
Kalkaska county: Kalkaska village	10	0	Kalkaska county: Garfield township	1	0			
Kent county: Grand Rapids city	551	25	Allegan county: Leighton township	2	0			
			Salem township	3	1			
			Barry county: Nashville village	1	0			
			Kalamazoo county: Schoolcraft township	2	0			
			Montcalm county: Edmore village	1	0			
			Newaygo county: Barton township	2	0			
			Ottawa county: Wright township	6	0			
			Allendale township	2	0			
			Holland city	5	0			
Kent county: Plainfield township	18	1	Kent county: Rockford village	4	0			
Kent county: Solon township	*		Kent county: Algoma township	8	0			
Lapeer county: Lenawee city	100	1	Lapeer county: Mayfield township	1	0			
Lenawee county: Dover township	8	0	Lenawee county: Clayton village	1	0			
Lenawee county: Hudson village	1	0	Lenawee county: Clayton village	17	0			

* This outbreak was not reported to this office by the Health Officer of the "first" locality at the time it occurred.

TABLE 8.—CONTINUED.

Primary Localities from which Scarlet Fever Spread.	In First Locality.		Secondary Localities infected from Primary.	In Second Locality.		Tertiary Localities infected from Secondary.	In Third Locality.	
	Cases.	Deaths.		Cases.	Deaths.		Cases.	Deaths.
Livingston county: Genoa township	*	----	Livingston county: Marion township	2	0			
Livingston county: Oceola township	3	0	Livingston county: Cohoctah township	2	0			
Marquette county: Marquette city	*	----	Marquette county: Republic township	30	1			
Menominee county: Menominee city	8	0	Dickinson county: Norway city	2	0			
Montcalm county: Crystal township	16	7	Montcalm county: Day township	16	3			
			Montcalm county: Evergreen township	9	5			
Newaygo county: Hesperia village	6	0	Newaygo county: Denver township	5	0			
Oakland county: Novi township	2	0	Oakland county: Commerce township	1	0			
Oakland county: Rose township	*	----	Oakland county: Highland township	1	0			
Oakland county: Rose township	*	----	Oakland county: Highland township	4	1			
Oakland county: Pontiac city	2	0	Oakland county: Waterford township	3	0			
Ottawa county: Grand Haven city	15	2	Ottawa county: Holland city	2	0			
			Midland county: Midland city	8	0			
Saginaw county: Saginaw city	90	0	Saginaw county: Chesaning township	4	0			
			Wayne county: Plymouth village	20	0			
Saginaw county	*	----	Shiawassee county: Venice township	4	0			
Sanilac county: Lexington township	*	----	Sanilac county: Croswell village	2	0			
Shiawassee county: Byron village	*	----	Genesee county: Gaines village	7	0			
St. Clair county: Port Huron city	38	2	St. Clair county: Kenockee township	1	0			
Tuscola county: Columbia township	*	----	Tuscola county: Fair Grove township	18	0	Tuscola county: Akron township	21	3
Tuscola county: Vassar village	*	----	Saginaw county: Frankenmuth township	4	0			
Van Buren county: Decatur village	*	----	Van Buren county: Breedsville village	1	0			
Van Buren county: Paw Paw village	4	0	Berrien county: Hagar township	2	1			
Washtenaw county: Saline village	*	--	Lenawee county: Clinton township	2	0			

* This outbreak was not reported to this office by the Health Officer of the "first" locality at the time it occurred.

TABLE 8.—CONCLUDED.

Primary Localities from which Scarlet Fever Spread.	In First Locality.		Secondary Localities infected from Primary.	In Second Locality.		Tertiary Localities infected from Secondary.	In Third Locality.	
	Cases.	Deaths.		Cases.	Deaths.		Cases.	Deaths.
Wayne county: Detroit city	819	71	Macomb county: Warren township	5	0			
			Marquette county: Michigamme township	9	0			
			Oakland county: Rochester village	2	0			
			Wayne county: Nankin township	1	0			
			Wayne village	1	0			
Upper Peninsula	*	----	Ottawa county: Talmadge township	3	0			
(*Outside the State.*)								
Canada	----	----	Sanilac county: Marlette township	9	0			
Chicago, Ill.	----	----	Berrien county: Watervliet township	45	0			
			Hillsdale county: Somerset township	2	0			
Denver, Col.	----	----	Hillsdale county: Ransom township	4	0			
Fremont, Ind.	----	----	Branch county: California township	9	0			
Kansas	----	----	Lenawee county: Hudson township	4	0			
Maine	----	----	Chippewa county: Drummond township	13	0			
Mississippi	----	----	St. Joseph county: Mendon township	4	0			
Montana	----	----	Genesee county: Davison village	10	0			
New York	----	----	Houghton county: Red Jacket village	105	12			
Ohio	----	----	Lenawee county: Seneca township	1	0			
Wisconsin	----	----	Kalamazoo county: Kalamazoo city	70	2			
			Midland county: Homer township	9	0			

* This outbreak was not reported to this office by the Health Officer of the "first" locality at the time it occurred.

REPORTED PERIOD OF INCUBATION OF SCARLET FEVER.

The following two tables exhibit the reported experience of the health officers in Michigan during the year 1891 concerning the period of incubation of scarlet fever:

TABLE 9.—*Exhibiting the Reported Period of Incubation, in days, for Scarlet Fever in 57 instances. Compiled from health officers' reports received for the year 1891.*

	Period of Incubation.																	
Period stated in days...	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	20	21	23
Number of instances in each period	3	3	2	* 5	5	† 9	**2	¶10	‡ 3	1	1	1	§ 5	1	1	‖ 3	1	1

* In one instance reported "about 5 days."
† Includes two instances reported as "about 7 days."
¶ Includes two instances reported as "about 9 days."
‡ Includes two instances reported as "about 10 days."
§ Includes two instances reported as "about 14 days."
‖ Includes one instance reported as "about 20 days."
** Includes one instance reported as "about 8 days."

The average of the above 57 reported periods of incubation is about nine (9.1) days; and the greatest number in any single period is that of nine days.

TABLE 10.—*Exhibiting relative to 12 instances of Scarlet Fever in Michigan in 1891, the Reported Period of Incubation within certain limits, stated in days; also the Means, the average of which may represent the average Period of Incubation.*

Days.	Means.	Days.	Means.	Days.	Means.
2 to 5	3.5	4 to 5	4.5	7 to 14	10.5
2 to 14	8.	5 to 10	7.5	10 to 15	12.5
3 to 4	3.5	5 to 12	8.5	16 to 20	15.
3 to 12	7.5	6 to 7	6.5	14 to 21	17.5

The average of the means in the above 12 instances is eight and eight-tenths (8.8) days.

LENGTH OF TIME SCARLET FEVER PATIENTS SHOULD REMAIN ISOLATED.

Notwithstanding the subject is treated of in the pamphlet [110.] issued by the State Board of Health, letters of inquiry are often received at this office, regarding the length of time a scarlet fever patient should be isolated, or the premises placarded.

The placard should remain so long as there is, in the premises, contagium which may communicate the disease.

As mentioned in the pamphlet [110.], persons recovering from scarlet fever should not be liberated so long as any scaling or peeling of the skin continues, which sometimes is not completed before the lapse of seventy or eighty days. After recovery from scarlet fever, no person should appear in public wearing the same clothing worn while sick with or recovering from this disease, except such clothing has been thoroughly disinfected, and this without regard to time which has elapsed since recovery.

The following is a proposed form:

HEALTH OFFICER'S CERTIFICATE OF FREEDOM FROM LIABILITY TO COMMUNICATE SCARLET FEVER.

I hereby certify that _____ (Name.) has entirely recovered from scarlet fever, the date of recovery being _____, 189__; that disinfection of the premises, where the disease has been, occurred _____, 189__; that the period of desquamation ceased _____, 189__; and that, after the peeling and scaling of the skin had ceased, the patient's clothing has been disinfected, _____ namely, on _____, 189__; and that he is now free from liability to communicate scarlet fever, and is at liberty to attend school, church and public assemblies.

_____

Health officer of the _____ (Township, city or village.) of _____

_____, Mich., _____, 189__

AGE AND SEASON OF GREATEST PREVALENCE OF SCARLET FEVER IN MICHIGAN.

The reports of local health officials in Michigan for the year 1891, gave the ages of 2,567 persons who were sick with scarlet fever and of 121 persons who died of that disease. Table 11 represents in certain age-groups, (1) the number of cases and (2) the number of deaths from scarlet fever; (3) the per cent that the cases in each group were of all cases of scarlet fever; (4) the per cent that the deaths in each group were of all deaths from scarlet fever; and (5) the per cent that the deaths in each group were of the cases in each group respectively,—compiled from all reports for the year 1891 which stated the ages.

By this table (11) it may be seen that the greatest proportion of cases of scarlet fever occurred in persons from 5 to 10 years of age,—over one-third (41.9 per cent) of all cases having occurred in that period of age. The next highest five-year period is the first five years of age, "0-5." From the second five-year period the numbers of cases grade downward, each succeeding period being lower than the preceding period.

The probable reason for the large proportion of cases in persons from 5 to 10 years of age is that a larger proportion of children commence going to school in that period than at any other (the schools being centers of infection in localities where cases of scarlet fever are not strictly isolated); and that a large proportion of persons in the later age-periods are protected by having had scarlet fever in earlier ages.

Ages of greatest mortality from and fatality of Scarlet fever.

By table 11 it may also be seen that the greatest proportion of deaths occurred in the first five-year period, about half of all deaths (49.6 per cent) having occurred in that age-period; and of these five years the greatest proportion of deaths (14.9 per cent of all deaths from scarlet fever) occurred in the second year of age.

The last line of this table, giving the per cent the deaths in each group were of the cases in each group respectively, is perhaps the most important one. When the data for several years can be combined in a line like this, it will go far towards settling the question as to the age in which there is least danger of a case of scarlet fever proving fatal in Michigan.

The data for the one year, 1891, indicate that there is greatest danger of a case proving fatal during the first five years of age, that there is less danger from 5 to 25 years of age, and that there is least danger after 25 years of age,—the per cent of cases proving fatal having been: in children under 5 years of age, 7.9; in persons from 5 to 25, 3.5, and in persons over 25, 0.

TABLE 11.—*Exhibiting in certain Age-Groups, the number of Cases and the number of Deaths from Scarlet Fever; the per cent that the Cases in each group were of All cases; the per cent that the Deaths in each group were of All Deaths; and the per cent that the Deaths in each group were of the Cases in that group,—Compiled from all reports for the year 1891 which stated the ages.*

	Number and per cent of Cases and Deaths in certain Age-groups.																
Ages in Groups of Years	All Ages.	0-1.	1-2.	2-3.	3-4.	4-5.	0-5.	5-10.	10-15.	15-20.	20-25.	25-30.	30-35.	35-40.	40-45.	45-50.	50-55.
No. of cases	2,567	29	106	164	228	233	760	1,075	486	145	42	25	17	11	3	2	1
Per cent the cases in each group were of all cases	100	1.1	4.1	6.4	8.9	9.1	29.6	41.9	18.9	5.6	1.6	1.0	0.7	0.4	0.1	0.08	0.04
No. of deaths	121	3	18	13	10	16	60	45	11	4	1	0	0	0	0	0	0
Per cent the deaths in each group were of all deaths	100	2.5	14.9	10.7	8.3	13.2	49.6	37.2	9.1	3.3	0.8	0	0	0	0	0	0
Per cent the deaths in each group were of cases in that group	4.7	10.3	17.0	7.9	4.4	6.9	7.9	4.2	2.3	2.8	2.4	0	0	0	0	0	0
		7.9						3.5				0					

Proportion of Scarlet Fever in the different months of the Year 1891.

Table 12 exhibits the proportion of scarlet fever reported in each month of the year 1891. The *first* line gives the per cent of all weekly postal-card *reports*, made by physicians in active general practice, who reported the presence of scarlet fever under their observation. The *second* line gives the average per cent of all these *reporters* who stated the presence of scarlet fever. The *third* line states the average order of prevalence of scarlet fever in the list of diseases reported. The *fourth* line represents the *prevalence* of scarlet fever, being a combination of the first and third lines of this table (the method of combining them is explained on pages 122-3 of the Annual Report of this Board for the year 1890). In this third line the smallest numbers indicate the greatest prevalence,—for instance, May is 1 or *first* in prevalence,—more scarlet fever in May than in any other month; October is 2 or *second* in prevalence; February is 3 or *third* in prevalence; and so on. The *fifth* line represents by months the number of outbreaks of scarlet fever reported to this office by health officers and clerks, including only the reports which gave the dates of out-

breaks,—reports of 36 outbreaks did not give dates and, of course, those outbreaks could not be included in this line.

The evidence in the various lines of this table (12) seems to indicate that in Michigan scarlet fever is most prevalent in the first half of the calendar year. But this evidence is only for a single year, and might, therefore, be exceptional. In Exhibit XIII., page 123, of this Annual Report for 1892, is a statement of the average per cent of weekly card-reports stating the presence of scarlet fever by months for the fourteen years, 1877-90, from which it appears that the maximum occurs in January, February and March, and the minimum in August.

TABLE 12.—*Scarlet Fever in Michigan during the year 1891, exhibiting, by months, the per cent of all weekly card-reports received which stated the presence of scarlet fever; the average per cent of all observers reporting weekly who reported scarlet fever; the average order of prevalence of scarlet fever where it was present; and the number of outbreaks reported by health officers and clerks of local boards of health.*

1891.	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Per cent of weekly card reports stating presence of scarlet fever.....	9	11	11	11	11	12	7	7	8	9	10	7	7
Average per cent of observers who reported scarlet fever present.....	17	24	17	19	23	18	13	13	14	21	17	11	19
Average order of prevalence where present.....	4.2	4.5	4.3	5.4	5.2	3.8	2.8	4.3	4.3	3.8	3.7	4.1	3.8
Prevalence*.....	8	5	3	8	7	1	6	12	10	4	2	11	9
Outbreaks.....	569	110	47	36	39	41	46	28	31	46	43	40	62

* Explained in the text accompanying this table.

SHOULD PREMISES IN WHICH LIGHT CASES OF SCARLET FEVER HAVE OCCURRED BE DISINFECTED?

The above question is asked in the following letter, received at this office, from R. M. Johnson, M. D., health officer of Novi township, Oakland county:—

"I have some questions to ask in regard to this present case of scarlet fever.

"1st. Where the premises are isolated, and disease of mild type with very little if any danger of the disease spreading, as the case was kept thoroughly anointed with oil and vasaline, would you think it necessary to disinfect the premises with sulphur, if the walls and floors were subjected to spray of mercuric bi-chloride solution? Now, why I ask this question, is this, the family has no place to go while the reno-

vation is going on; and by keeping the scales loaded with oil and vaseline don't think they could float around the room.

"The case was convalescent before reported, so had nothing to do with discharges at all. All clothing has been well washed and aired right along; and they (the family) claim every precaution has been taken so far to stop the spread of the disease.

"Will wait for your answer."

In reply to Dr. Johnson's letter the Secretary wrote to that gentleman, October 28, 1891, as follows:

"I think it is necessary in every instance to disinfect the premises, etc., where scarlet fever has been present. In the instance which you mention, there would seem to be no question, as you say that 'the case was convalescent before reported,' and disinfecting should be performed, and this without regard to the time which has elapsed since recovery.

"In some instances (like the one you mention) it is necessary to provide temporary shelter while disinfecting the premises, and local boards of health should be consulted, and should be prepared to act in accordance with § 1671 Howell's Statutes.

"I enclose a marked pamphlet bearing upon the above subject."

SHOULD ADULT MEMBERS OF FAMILIES IN WHICH SCARLET FEVER EXISTS BE ISOLATED?

The following letter from Dr. H. F. Zigler, health officer of Pinckney village, Livingston county, and the Secretary's response thereto, bear on this subject:

"DEAR SIR:—I have to report scarlet fever prevailing here, of a moderately severe type. Please send printed matter necessary.

"What should be done in restricting adult members of the family, not caring for the sick, from spreading the disease? For instance the father who does not handle the patients or enter the room, must he abstain from public business during the continuance of the disease in his family?"

"*Lansing, Mich., November 18, 1891.*

"DR. H. F. ZIGLER, *health officer of the village, Pinckney, Mich.*

"DEAR SIR:—Accept thanks for your letter of November 16, relative to scarlet fever.

"By this mail I send you pamphlets on the prevention and restriction of the disease, and blanks for reports to this Office.

"In response to your question,—If the patients are kept strictly isolated from all other persons, except the nurses and attending physician, and the father does not come into contact with the nurses or infected room or articles, I see no good reason why he should be kept in isolation. We must not forget however, that the disease is spread very often by persons coming into contact with infected clothing or other articles, and thus communicate the disease to others."

SMALL-POX IN MICHIGAN IN 1891.

There were reported to the Secretary of the State Board of Health two cases of small-pox and one case of varioloid as having occurred in three localities in Michigan during the year ending December 31, 1891. Each of the three outbreaks was restricted to the first case, and no deaths occurred. The localities where these outbreaks occurred, were the cities of Cheboygan, Detroit and St. Joseph. The histories of the several outbreaks, so far as known at this office, are as follows:

SMALL-POX IN CHEBOYGAN, CHEBOYGAN COUNTY.

August 12, 1891, S. A. St. Amour, M. D., health officer of the city of Cheboygan, reported to this office an outbreak of variola, in the person of a young man named George Kassler, aged 23 years; and stated that the patient, and all other persons known to have been exposed to infection from the disease, had been isolated and were then in isolation.

Source of Contagium.

September 1, 1891, Dr. St. Amour reported the case as recovered. In his final report of the outbreak, he gave the source of contagium, "Brought here by a man from Bay City." As no notice had been received at this office of the existence of small-pox at Bay City, the Secretary of this Board wrote to Dr. St. Amour, as follows:

"Please accept thanks for your report of the outbreak of variola which began August 13, and ended September 1.

"You say that the source of contagium and mode of introduction of the disease into your jurisdiction was—'Brought here by a man from Bay City,' and that you can trace the case to a previous one.

"Will you have the kindness to tell me the name of the man from Bay City, and if he was the man who was sick with the disease at Cheboygan?

"Was the man from Bay City the 'previous case' you refer to? If not, where was the 'previous case?'

"Any information which you may be able to give that will assist me in tracing further the *source* of the outbreak in your city, will be thankfully received."

In reply to the foregoing letter, Dr. St. Amour wrote to the Secretary September 9, 1891:

"Geo. Kassler is the man's name who had the variola. He came here from Bay City 18 days before he came down with variola. Therefore he must have been exposed to the disease at Bay City. This is all that I can tell concerning the source."

Dr. St. Amour gave 21 days as the period of incubation in this case.

VARIOLOID IN DETROIT.

The Detroit "Evening News" of September 11, 1891, contained the following paragraphs:

"Last Sunday afternoon the 3-year-old daughter of a Polish laborer, named Grendzinski, was taken sick, becoming very feverish. Monday a doctor was summoned for the child, but suspecting that it was a case of small-pox, he called in counsel and on Tuesday the case was reported to the board of health, and on Wednesday Drs. Klein and Chapoton visited the sick child, but were not absolutely certain that it was a veritable case of small-pox until yesterday, when the disease made itself evident in a most unmistakable manner.

"On account of the doubtful nature of the case no quarantine had been established up to last evening, but then it was decided to remove the sick child to the pest house. To this the father most strenuously objected. In fact, he threated riot if any such move were made. In consequence of this opposition the removal was postponed until this morning, in the hope that the father would become amenable to reason.

"The house, No. 964 Riopelle street, is occupied by two families. In the Grendzinski family there are two other children and several in the family of the other tenant. The neighborhood is one of the most thickly settled of the Polish district, and owing to the prejudice among those people against vaccination there is danger of a spread of the contagion."

As soon as the above-quoted paragraphs came to the knowledge of this Office, the letter of enquiry usual in such cases was sent to the health officer of Detroit. September 12, the outbreak was officially reported to this Office, and October 8, 1891, the following letter was received from the health department of Detroit:

"I neglected to state in my last weekly report that the case of Bronislad Gendzinski, varioloid, recovered September 26, and was discharged from the City Hospital on that date. No other cases in Detroit."

SMALL-POX IN ST. JOSEPH, BERRIEN COUNTY.

September 18, 1891, Dr. Jno. W. Doyle, health officer of the city of St. Joseph, reported to this Office, an outbreak of small-pox, in his jurisdiction, in the person of Ernest Holland, a young man of twenty-five years of age. Dr. Doyle stated in his outbreak report that the patient had been isolated and all necessary precautions had been taken to prevent the spread of the disease. On receipt of Dr. Doyle's report, the usual Inter-State notification of the outbreak was immediately sent to Secretaries of other State Boards of Health; and, warning of the presence of the disease in St. Joseph, was sent to the all health officers whose jurisdictions are contigious to that city or were supposed to be in danger of invasion should the disease spread.

In his final report of the outbreak, Dr. Doyle reported the source of contagium "not known," stated that the patient recovered, and that there was no spread of the disease.

SMALL-POX IN 1891 COMPARED WITH PREVIOUS YEARS.

TABLE 1.—*Exhibiting for each of the Ten years, 1882-91, the number of reported Localities, Outbreahs, Cases, Deaths, Average number of cases per Locality, Average number of Cases per Outbreak, and per cent ratio of Deaths to Cases of Small-pox in Michigan. Compiled in the Office of the Secretary of the State Board of Health, from reports made by local health officers.*

Years.	Localities.	Outbreaks.	Cases.	Deaths.	Average Number of Cases per Locality.	Average Number of Cases per Outbreak.	Ratio of Deaths to Cases. Per Cent.
1882	61	----------	589	159	9.7	----------	27
1883	8	----------	29	2	3.6	----------	7
1884	5	4	22	3	4.4	5.5	14
1885	9	9	27	6	3	3	22
1886	4	4	*24	7	6	6	29
1887	2	4	†4	0	2	1	0
1888§	11	12	42	6	3.8	3.5	14
1889	14	‡14	57	4	4	4	7
1890	2	2	†2	0	1	1	0
1891	3	3	†3	0	1	1	0

* Includes two cases varioloid.
† Includes one case varioloid.
‡ This number includes two outbreaks which began in 1888, but the majority of cases and deaths in which occurred in 1889.
§ The numbers in this line, in a similar table on page 273 of the Annual Report of this Board for the year 1889, erroneously contained 18 cases and one death at Azalia, which occurred in 1889; the numbers here given for 1888 are the correct ones.

SMALL-POX IN OTHER STATES IN 1891.

The following outbreaks of small-pox in localities outside of the State of Michigan were reported to this office in compliance with the resolution adopted by the International Conference of State and Provincial Boards of Health, held at Toronto, Ontario, October 6, 1886:—

At St. Paul, Minnesota, August 13, 1891.

At Quebec City, Carleton, Shoolbred and Nouvelle, St. Damase, St. Paul de la Croix, St. Clement, Ile-Verte, Pabos, Newport, Ascot, Sherbrooke City, La Jeune Lorette, Lauzon, Sandy Bay and Brompton, in the Province of Quebec, during the months of November and December, 1891.

THE PREVENTION OF SMALL-POX.

Although Michigan was free from small-pox in the early months of 1891, still, owing to prevalence of the disease in several other States, the Secretary of this Board deemed it advisable to warn the public of the presence of the disease in neighboring States, and to urge the adoption of precautionary measures calculated to prevent the introduction of the disease into Michigan, and to restrict its spread should it find entrance there. With this object in view, the following circular was prepared by the Secretary and, by direction of the Board, widely and thoroughly distributed throughout the State:

THE PREVENTION OF SMALL-POX.

NOW IS A GOOD TIME TO BE VACCINATED.

[617.]

To the Health Officer:

DEAR SIR:—Small-pox is usually most prevalent in the winter and spring months (reaching the highest point in May), and it tends to reappear after somewhat regular intervals of time, sometimes five or ten years; thus the maximum deaths from small-pox in Michigan have been reported in 1872, 1877 and 1882.

At the time of the preparation of this circular, small-pox is reported as follows:—It is prevalent in different parts of Texas; eleven cases are distributed in four different places in Pennsylvania; sixteen cases in Georgia; six at Hardeville, South Carolina; one in the State of New York; one in Ohio (person recently from Louisiana); three in Macoupin county, Illinois; and one in Wisconsin. Small-pox is thus reported in all the States bordering on Michigan except Indiana.

The rarity of small-pox in Michigan for several years has led to a feeling of security, and it is feared, to neglect of vaccination, resulting in an increased proportion of inhabitants, who are not protected by recent vaccination. This might make possible a wide-spread epidemic, if small-pox should enter the State in such a manner that exposure to it should be general, as is favored by improved facilities for general and rapid travel through and about the State.

The proper preventive of such a calamity is general vaccination and revaccination of all persons not already thus protected.

The law under which general vaccination may be favored by local boards of health is as follows:—

Act No. 146, Laws of 1879, entitled "An act to authorize boards of health of cities, villages and townships to furnish vaccination to the inhabitants thereof."

SECTION 1. *The People of the State of Michigan enact,* That the board of health of each city, village and township may, at any time, direct its health officer or health physician to offer vaccination, with bovine vaccine virus, to every child not previously vaccinated, and to all other persons who have not been vaccinated within the preceding five years, without cost to the persons [person] vaccinated, but at the expense of such city, village or township, as the case may be.—§1685 Howell's Statutes.

Bovine vaccine virus is propagated and sold by E. L. Griffin, M. D., Fond du Lac, Wisconsin; also by Dr. H. A. Martin & Son, Roxbury Station, Boston, Mass. Virus is for sale by most druggists.

The virus should be fresh. The State Board of Health does not compete with druggists in supplying vaccine virus.

Because of the occurrence of small-pox as above mentioned, and the possible increasing proportion of unprotected inhabitants, it is respectfully suggested that unusual watchfulness should be maintained, and suspicious cases carefully isolated, that all persons exposed directly or indirectly be promptly vaccinated, and all infected material destroyed or disinfected.

I trust you will promptly notify this office on the occurrence of any suspicious case, and, as the law requires, keep this office "constantly informed respecting every outbreak of a disease dangerous to the public health, and of the facts * * * respecting sources of danger of any such diseased person or infected article being brought into or taken out of" the township, city or village of which you are the health officer.

Any aid which this office may be able to give you will be cheerfully rendered.

By direction of the State Board of Health.

Very respectfully,

HENRY B. BAKER,
Secretary.

Lansing, Mich., February, 1891.

The foregoing circular was extensively published, and favorably commented on by the press of the State; and the following two paragraphs evidence the appreciation accorded it:

"PREVENTION IS BETTER THAN CURE.—Henry B. Baker, Secretary of the State Board of Health, has sent out circulars to the health officers of Michigan, in which he calls attention to the fact that small-pox is prevalent at the present time in all the states bordering on our peninsulas except Indiana. The disease has not appeared in Michigan to any noticeable extent for a number of years, and this fact, it is thought, has perhaps lulled the people into a sense of security and caused them to neglect the only prevention

known against the plague, vaccination. It is feared that if this precaution has been neglected to any great extent, if the disease should now gain a foothold within our borders, possibly a widespread epidemic might prevail.

"The proper safeguard against such a calamity is general vaccination and revaccination of all persons not protected by this means, and every one who is unprotected is reminded that it is a duty which he owes both to himself and society to take immediate action in this regard.

"Because of the occurrence of small-pox as above mentioned, and the possibly increasing proportion of unprotected inhabitants, the circular alluded to makes the suggestion to health officers that unusual watchfulness should be maintained, and suspicious cases carefully isolated, that all persons exposed directly or indirectly be promptly vaccinated, and all infected material destroyed or disinfected."—*Jackson Daily Citizen, February 25, 1891.*

"A circular from Henry B. Baker, Secretary of the State Board of Health, says that small-pox is reported in all the states bordering on Michigan except Indiana. The proper prevention of a small-pox epidemic is a general vaccination and revaccination of all persons not already thus protected. The law provides that any city, village or township may direct its health officer to offer vaccination free of charge, to every child not previously vaccinated, and to all other persons who have not been vaccinated within five years. With small-pox on all sides of us, and the large number of people who are daily traveling through and about our State it would not be strange if the dread disease should enter our borders. In view of this, it is a timely suggestion from the Board of Health that unusual watchfulness should be maintained, and suspicious cases carefully isolated, and that all persons exposed directly or indirectly be promptly vaccinated and all infected material destroyed or disinfected."—*Montcalm Herald, Stanton, Mich., February 27, 1891.*

MEASURES TAKEN TO EXCLUDE SMALL-POX.

November 12, 1891, the following telegram was received at this office from E. S. Petit, chief of police at Port Huron:

"Family with two mild cases small-pox stopped and returned to Canada this morning. Balance of emigrants out of same car on train eighteen, going west. Conductor Holmes."

On the same date (November 12, 1891), J. K. Farnum, M. D., health officer at Port Huron, telegraphed to this Office as follows:

"This morning ordered car back, and Grand Trunk took it to Pt. Edward, ordered it sidetracked and not to be brought into United States again."

On receipt of the above telegrams, the Secretary of this Board immediately dispatched the following telegrams:

"*City Health Department, Chicago, Ill.:*
"Grand Trunk train two, reaches Chicago, 5:50 tonight, contains immigrants exposed to small-pox. Cases turned back Port Huron this morning."

"*Dr. John K. Farnum, Health Officer, Port Huron, Mich.:*
"Please disinfect car on which cases small-pox came this morning, and report all details of small-pox."

"*Dr. P. H. Bryce, Secretary Provincial Board of Health, Toronto, Ontario:*
"Two cases small-pox Port Huron this morning, returned into Canada."

"*Dr. P. H. Bryce, Toronto, Ontario:*
"Small-pox infected car side-tracked at Pt. Edward. Respectfully suggest disinfection."

The following replies were received to the foregoing telegrams:
From Commissioner of Health, Chicago:

"Accept hearty thanks for telegram yesterday."

From P. H. Bryce, Toronto, Ontario:

"Medical officer of long experience at Sarnia reports both cases to be measles. Precautionary quarantine instituted."

November 12, 1891, the Secretary of this Board wrote to E. S. Petit, Chief of Police at Port Huron as follows:

"Please accept very hearty thanks for your telegram relative to the cases of small-pox returned to Canada this morning, and 'immigrants out of same car on train eighteen (18) going west.'

"I have taken what action I could; but would like to have more information:—First, as to the car in which the cases were. What was done with it? Was it disinfected? If so, how? Where is the car now? How much vaccination has been done among those exposed to the disease?"

In reply to this letter, Mr. Petit wrote, Nov. 13, 1891:

"In answer to your questions will say: The people were returned to Canada in the car they arrived in and railroad company notified not to bring the car across the river until thoroughly disinfected. The customs authorities issued orders, at our request, to their men at the crossing, not to allow this car to enter until this order had been complied with. The car is now in Canada. There was only one man exposed to the disease, who has had it, I think. He simply passed through the car as interpreter to find their wants."

November 12, 1891, the Secretary wrote to Dr. Farnum, Health Officer of Port Huron, relative to this subject, as follows:

"I sincerely hope the car will be disinfected, otherwise at some future time it may slip into service and spread the disease.

"Will you have the kindness to write me details about the cases, whether in the first or what stage of the disease? Also what is being done at Port Huron in the way of inspection? How you learned the presence of these cases, and what suggestions you have to offer as regards the desirability of an inspection service under the State law?"

In answer to this letter Dr. Farnum wrote, Nov. 13, 1891:

"In reply to the letters of 13th and 14th, will say in reference to the two cases of varioloid, Chief of Police Petit and myself received a telephone message from Mr. Anderson, Station Agent, Fort Gratiot, on the morning of the 12th that they had two children sick on car 322, 2nd class. (I gave orders to the railroad company last spring when I assumed the office of city physician, to report any suspicious cases coming across the river to me before they let them proceed west, and they comply promptly.) We received message at 8 o'clock, and both at once went to Fort Gratiot and found man, wife, three children, in car 322. I went in and inspected them. Two children had a mild varioloid, one 15 or 20 pustules on face, the other 30 or 40. Had the mother hold one up to the window so the chief could see, and at the distance of six or eight feet he could see that there was matter under the scabs; we immediately ordered the agent to return car to Point Edward, which he did in our presence. We then went to the Collector of Customs and had him (Mr. Gew) issue orders not to admit said 322 into the U. S. until they had communicated with me, so I could see it properly inspected. From the time of its arrival until returned, was less than one hour.

"There is very little chance of my making a mistake in varioloid as I have had the same, and watched the disease on myself, some years ago. Twice in the history of the railroad, cases have been reported measles, once at Pt. Edward and once in Port Huron, that turn out varioloid. We have the authority to exclude and return these cases and shall continue to do so; and the railroad company well know it, and are very careful to report. As to the other car of seventeen, it had pulled out with the train, and was out of our jurisdiction. We telegraphed you, also health officer of Chicago. I think we took all precaution and promptly."

Inspection of Immigrants and Travelers at Detroit and Port Huron.

In view of the prevalence of small-pox in Canada and the continual influx of immigrants to the United States via that country, some of whom crossed the Atlantic on ships infected with dangerous communicable diseases, it was believed to be necessary for the public safety, that inspection of all travelers and immigrants arriving at the chief ports of ingress to this State be instituted.

Acting on this belief, the Secretary entered into correspondence, the

objects and results of which are demonstrated in the copies of letters and telegrams which follow:

November 12, 1891, the Secretary transmitted to the members of the Michigan State Board of Health a letter which he proposed to send to the Governor of Michigan. The letter was approved by the members of the State Board, and the following is a copy of the letter which was sent to the Hon. Edwin B. Winans, November 16, 1891:—

"MICHIGAN STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY,
Lansing, Mich., November 16, 1891.

"HON. EDWIN B. WINANS, *Governor of Michigan:*

"DEAR SIR:—According to official reports, there were, November 3, 1891, 55 cases of small-pox scattered through five counties of the Province of Quebec; and since September 8, one hundred and ten cases have occurred in eleven municipalities distributed in six different counties of that Province.

"November 12, the following telegram was received by the Secretary of this Board:—

'*Port Huron, Mich., November 12, 1891.*

'*State Board of Health:*

'Family with two mild cases of small-pox stopped and returned to Canada this morning. Balance of immigrants out of same car on train eighteen going west. Conducter Holmes.

E. S. PETIT, *Chief Police.*'

"Considering that the cold season, when there is great danger of spreading small-pox, is now approaching; that the 55 cases, scattered, as they are, through five different counties of Quebec indicate that the disease is getting beyond control there; and when we add the fact that at this time of year and later the usual immigration from the province of Quebec and beyond into Michigan includes those who come into our State to work in lumbering camps,—this Board respectfully suggests to you the question whether it is advisable that, under Act No. 230, Laws of 1885, a State Inspection of immigrants and travelers be established at the point or points of greatest danger of entrance of immigrants from, or who have come through, the small-pox infected districts of Canada.

"Bearing upon this question,—the laws in Michigan authorize local boards of health to maintain quarantine, also inspection and restraint of infected travelers; but the thorough inspection of immigrants, in such numbers as now come into this State at such places, as Port Huron, for instance, is too expensive to be undertaken by the local board, especially as the danger to residents in Port Huron is slight compared with the danger at the places of destination of the immigrants. There is question whether the danger is not generally, as it certainly is sometimes, as great to other northwestern states as it is to Michigan, because many of the immigrants pass on through Michigan to other states. Heretofore the inspection service has been maintained, in times of danger, by this State part of the time, and part of the time by the United States government. There has been an appropriation by the National Congress subject to use for this purpose on application of Governors of States.

"The action likely to be taken by local boards of health is not such as can be relied upon to protect the people of Michigan, nor the people of the United States. In the recent instance, November 12, the persons found sick believed to be with small-pox, were ordered returned to Canada, as was also the car in which they came; but the accompanying immigrants from the same car were permitted to pass on in and through Michigan.

"Section 2 of Act No. 230, Laws of 1885, authorizes this Board to establish such systems of inspection as may be practicable and needful; but in order to carry on such inspection, money is required. A large portion of the ten thousand dollars appropriated by Act 230, Laws of 1885, is still unused. If in your opinion it is necessary to use such appropriation to maintain such State inspection service at Port Huron, or any other place in Michigan, until danger ceases or until the State is relieved by the United States government, this Board is ready to act, and awaits your decision.

"The Surgeon General of the U. S. Marine Hospital Service informs me that if you, according to custom, make formal request an inspector will be appointed at Port Huron; also, if requested, at Detroit, the inspection being carried on by the United States government.

"Since the foregoing was written, the health officer in Canada opposite Port Huron claims that the cases returned there November 12 are measles instead of small-pox. But this does not change the fact that there is small-pox in the province of Quebec, which may at any time come this way.

"By direction of the State Board of Health.

"Very respectfully,

"HENRY B. BAKER, *Secretary.*"

Telegram to Dr. P. H. Bryce, Secretary Provincial Board, Toronto, Ont., November 16, 1891:—

"In view of small-pox five counties of Quebec, also ordinary dangerous diseases, and immigration to Michigan and Northwest, do you see any serious objection to inspection at Port Huron and Detroit?

"HENRY B. BAKER."

Telegram to Dr. Henry B. Baker, November 16, 1891:—

"No cases in western Quebec. I have faith in La Chapelle. I do not deem border inspection necessary at Montreal. Inspection at river injures traffic.

"P. H. BRYCE."

November 16, 1891, the Secretary of this Board conferred with the Governor of this State relative to the establishment of inspection at Detroit and Port Huron. The result of said conference is shown in the following letters and telegram:—

"MICHIGAN STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY,
Lansing, Mich., November 17, 1891.

"HON. E. B. WINANS, *Governor of Michigan:*

"DEAR SIR:—In accordance with your request, I telegraphed yesterday to the Secretary of the Board of Health of the Province of Ontario, relative to the proposed inspection at Port Huron and Detroit. My telegram was as follows:

'*Dr. P. H. Bryce, Secretary Provincial Board, Toronto, Ontario:*

'In view of small-pox five counties of Quebec, also ordinary dangerous diseases, and immigration to Michigan and northwest, do you see any serious objection to inspection at Port Huron and Detroit?'

"His reply, received today, is as follows:

'No cases in western Quebec. I have faith in La Chapelle. I do not deem border inspection necessary at Montreal. Inspection at river injures traffic. P. H. BRYCE.'

"While it is possible, as Dr. Bryce suggests that the inspection to exclude dangerous disease may injure traffic slightly, and might leave diseased persons to be cared for on the Canadian side of the line, still the introduction of dangerous disease into this country may also injure traffic in the United States, and what is of more consequence, endanger human life. Therefore, according to your suggestion, I have prepared and respectfully submit herewith, for your consideration a memorandum for a communication to the Secretary of the Treasury of the United States, asking for the inspection referred to in my communication of yesterday.

Very respectfully,

HENRY B. BAKER, *Secretary.*"

"*To the Honorable Secretary of the Treasury of the United States, Washington, D. C.*

"SIR:—Official reports show that small-pox is present in five counties of the Province of Quebec; the season now approaches when there is especial danger of small-pox spreading, and when many come into Michigan from Canada to work in lumbering camps; and the tide of immigration is from and through Canada to the states of the northwest. I am informed that there is an act authorizing the President to use money in aid of local boards of health and otherwise in preventing and suppressing epidemic disease, the expenditure of which fund, I understand, is through the Marine Hospital Service in your Department. Accordingly I have the honor to request that you cause to be established at Port Huron and at Detroit an inspection of immigrants and travelers from or who have come through the infected counties of the Province of Quebec, and who propose to enter the United States at those places, and that such inspection service be maintained at least until the unusual danger from the spreading of small-pox is over.

"This proposed inspection may well tend not only to exclude small-pox, but also to ascertain, as I understand is now being done at New York, to what extent other dangerous diseases are being brought into this country through those places of entry of immigrants, and exclude not only small-pox but other dangerous diseases."

"TREASURY DEPARTMENT,
OFFICE OF THE SUPERVISING SURGEON-GENERAL,
MARINE-HOSPITAL SERVICE.
Washington, D. C., November 23, 1891.

"DR. HENRY B. BAKER, *Secretary State Board of Health, Lansing, Mich.*

"SIR:—The Governor of Michigan has made a request to have Sanitary Inspectors appointed at Port Huron and Detroit, Mich. I have the honor to request that you will suggest the names of two competent physicians to act as Sanitary Inspectors, one at Detroit and one at Port Huron, whose services can be immediately secured for the inspection of immigrants. Five dollars per day will be allowed to each inspector while on duty. An immediate reply is requested.

Respectfully yours,

WALTER WYMAN,
Supervising Surgeon-General, M. H. S."

Telegraphic response:—

"DR. WALTER WYMAN, *Surgeon-General, Washington, D. C.*

"I recommend Drs. J. J. Mulheron, Detroit, Hiram R. Mills, Port Huron.

"*November 27, 1891.*

HENRY B. BAKER."

November 23, 1891, the following circular was issued from this office:—

"*Inspection to exclude Dangerous Disease.*

"Small-pox is scattered through five counties of the Province of Quebec.

"While there may be little danger of small-pox to the Province of Ontario from immigrants to Michigan and the Northwestern States who come from or through any of the five counties in the Province of Quebec where small-pox is, there is danger of small-pox being spread at the places of destination of those immigrants, where their baggage, clothing, etc., are unpacked. At this time of year when Canadians come to the lumbering camps in Michigan, we are especially anxious if small-pox is present, as it now is, in one of the provinces east of us. The State Board of Health has suggested an inspection at Port Huron and Detroit; the Governor has acted, and it is hoped that the inspection will be had until the unusual danger of the introduction of disease through those ports is passed. There is no small-pox in Michigan. We want to keep it out of the State.

"The inspection may also keep out and give us warning of other dangerous diseases, as is now done at New York.

"*Lansing, Mich., November 23, 1891.* HENRY B. BAKER."

H. W. A. [*Copy.*]

TREASURY DEPARTMENT,
OFFICE OF THE SUPERVISING SURGEON-GENERAL,
MARINE-HOSPITAL SERVICE,
Washington, D. C., November 28, 1891.

DR. J. J. MULHERON, *U. S. Sanitary Inspector, M. H. S., Detroit, Mich.*

SIR:—You are hereby directed to inspect at the port of Detroit, all immigrants and travelers bound for the United States and coming from the counties of Bonaventure, Remouski, Temiscouata, Gaspé, Sherbrooke and Quebec in the Province of Quebec, or from any other place in that Province where small-pox is known to exist, or may occur hereafter.

Persons suffering from small-pox, or other dangerous contagious diseases will not be permitted to enter the United States.

Immigrants, or travelers coming from the counties above mentioned, and who it is believed are likely to have been exposed to the contagion of small-pox, will not be permitted to enter the United States, unless they can produce satisfactory evidence that they have had small-pox, or that they have been recently successfully vaccinated or will permit of vaccination. You will vaccinate free of charge all unprotected persons coming from the Province of Quebec, where small-pox exists or may hereafter occur.

The baggage of all persons coming from any infected district in the Province of Quebec and believed to be infected, must be thoroughly disinfected before passing.

You will make weekly reports to this Office of the work performed, which should include the number of persons excluded, number of persons vaccinated, number of pieces of baggage disinfected.

Respectfully yours,

(*Signed*) WALTER WYMAN,
Supervising Surgeon-General, M. H. S.

November 28, 1891, a circular letter signed by the Secretary of the Provincial Board of Health of Ontario, was received at the Office of the Secretary of the Michigan State Board of Health. A similar circular was received by the Governor of Michigan, and was probably received by officers and members of other State Boards of Health. Correspondence relative to it was as follows:

"MICHIGAN STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY,
Lansing, Mich., November 28, 1891.

"*Member of the State Board of Health.*

"DEAR SIR:—Herewith please find a copy of a letter sent to Dr. Bryce of Toronto in reply to his printed circular, which you may have seen mentioned in the newspapers. He requests all State Boards to point out to the Chief Officer of the Marine Hospital Service the 'unreasonableness' of the proposed inspection of immigrants at Port Huron and Detroit; claims that 'the action taken by the State Board of Michigan which has led to the inspection instituted by the Marine Hospital Service is wholly uncalled for,' he quotes long telegrams from managers of the two main trunk lines of Canadian railways. Some of his other arguments may be readily inferred from my reply.

Very respectfully,
HENRY B. BAKER, *Secretary.*"

"MICHIGAN STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY,
Lansing, November 28, 1891.

"To PETER H. BRYCE, M. D., *Secretary Provincial Board of Health, Toronto, Ontario.*

"DEAR DOCTOR:—Your circular letter of November 25, is before me, stating reasons why you have not notified the different State Boards, concerning the presence of small-pox in Ontario, as required by agreement. For this accept my thanks. Permit me to suggest, however, that your communication contains more than is required by the agreement of the Conference, or by the present circumstances. I do not understand that you are specially called upon or competent to advise all the State Boards in the United States and neighboring countries as to just what should be the action of the Michigan State Board of Health or of its Secretary, in dealing with interests of life and health of citizens under its care, in this particular case or in any case. My telegram to you before our action was taken in this instance, asked you to advise this office on this subject; you did so, and I hereby thank you. Your advice was duly weighed, as was also other advice, and action has been taken. Permit me to suggest that your circular is late, is addressed to too many persons, and contains appearances of a great desire to favor railroad companies, not so great concern for the safety of life and health in Michigan or States west of us.

"You cite as a model, the action or non-action of the Ontario Board of Health in 1888, when 'hundreds of cases of small-pox existed in Buffalo and vicinity, this Board deemed it necessary to have only one inspector stationed in Buffalo to keep it informed of the measures which were being taken by the health authorities there for stamping out the disease, and to keep local boards along the border on the alert for any cases that might pass over the river.' The result seems to have been 'fifty-four cases of small-pox with three deaths, in Ontario.' Where does the responsibility rest for those cases and deaths? Would not a thorough inspection service, between Buffalo and Ontario, have prevented them?

"The 60 cases and 7 deaths in Michigan in 1888, referred to by you, mostly resulted from the introduction of a case of varioloid from Dakota, in a way against which it is not probable that any inspection could have been effective. But it is possible that a thorough inspection service between Ontario and Michigan might have prevented a few of the cases in Michigan in 1888: eleven cases and two deaths at Lansing were alleged to have resulted from 'James Rowe coming from Sarnia, Canada.' Two of the other outbreaks were reported as having come from the same source. It is now too late to remedy this; but perhaps it is not too late to stop a repetition?

"While you are in error in supposing that the two cases of varioloid returned to Canada November 12

were the basis of action for inspection, the health officer at Port Huron is positive that they were not measles, but varioloid, one of them having twenty or thirty pustules on the face—with 'matter under the scabs.'

"I did not understand that the agreement for inter-state notification of dangerous diseases was entirely or mainly in the interest of railroads and travel, as you seem to imply. My belief is that it was and is designed mainly in the interest of public health.

"Your argument based upon the distance from Quebec to the Western States, must have been intended for the 'uninformed public,' because, in common with all sanitarians, you must know that the two-weeks period of incubation of small-pox is long enough for an emigrant exposed in Hamburg to cross the ocean and go a thousand miles into this country in time to spread the disease at his destination.

"In your circular, is a statement by a railway manager that 'An inspection against this at Windsor would be very like a Canadian inspection at Detroit against a disease prevailing on the gulf of Mexico.' This seems to me either to ignore the fact of the tide of immigration into Michigan and the Northwest through Port Huron and Detroit, or to be based upon ignorance of the fact that there is *not* a great rush of emigrants from the gulf of Mexico into Ontario by way of Detroit.

"Small-pox is not the only disease (nor the one which should be most feared in Michigan) that is brought into Michigan and the Northwestern States by immigrants. We need an inspection of immigrants at Port Huron and at Detroit, for reasons which I have not yet had time to explain to you, and which, if you will exercise your usual good sense, you will appreciate, when they shall be placed before you.

Very respectfully,

HENRY B. BAKER, *Secretary*."

Small-pox did not gain entrance into Michigan, and there was no serious interference with railroad travel.

MEASLES IN MICHIGAN.

DURING THE YEAR ENDING DECEMBER 31, 1891.

There were reported to the Secretary of the State Board of Health in all 394 outbreaks of measles, in 379 local jurisdictions, as having occurred in Michigan during the year 1891; and in these outbreaks there were reported to have occurred 12,173* cases and 149* deaths. For the preceding year, 1890, there were reported only 11,911 cases and 140 deaths in 407 local jurisdictions. Each year the State Board of Health is making more effort to get local health officials to take measures to prevent the spread of measles, and to make reports to this office concerning that disease in their localities, and it is probable that a larger proportion of the actual numbers of cases and deaths were reported in 1891 than in 1890† or previous years.

TABLE 1.—*Exhibiting the reported number of deaths from measles per 100,000 persons living in Michigan in each of the 24 years, 1869–91. Compiled from the Secretary of State's Vital Statistics of Michigan. (Population estimated by average annual increase, by Dr. Wilbur, Chief of Vital Statistics in State Department.)*

Year.	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.
Deaths (per 100,000, etc.)...	8.66	1[illegible].88	4.72	5.45	14.12	18.56	8.37	9.50	8.10	4.18	1.03	10.49
Year.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.
Deaths (per 100,000, etc.)...	7.63	15.21	8.68	14.54	7.91	2.04	6.75	14.56	20.62	5.[illegible]8	10.94	10.51

* Only the 33 cases which died were reported from the city of Detroit. If in that city the deaths were the same per cent of the cases as were reported for the rest of the State (.96 of one per cent) 3,454 cases of measles occurred in that city during the year 1891, making the number of cases for the whole State 15,594, instead of 12,173 as given above. But probably not half of the cases of measles were reported, as is evidenced in the note following this.

† Probably not half of the cases and deaths are yet reported; this is evident from the fact that for the year 1891 there were reported to the Secretary of State 225 deaths from measles; and it is well known that not all deaths are reported to the Secretary of State. The Secretary of the State Board of Health estimates that in order to equal the actual number of deaths, the reported deaths should be increased by forty per cent. If this is done, the probable number of deaths from measles in 1891 is found to be 315.

Reported Deaths from Measles in Michigan, 24 Years, 1868-91.

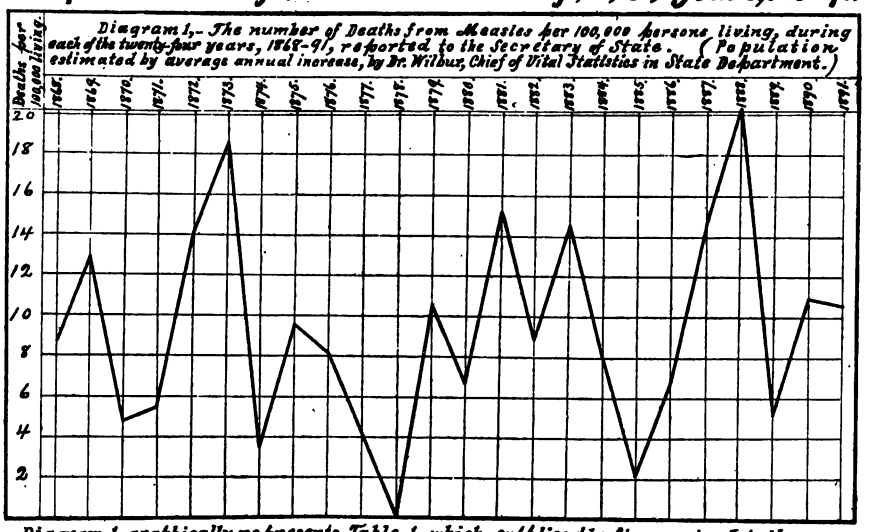


Diagram 1, graphically represents Table 1 which supplies the figures in detail.

MEASLES SHOULD BE RESTRICTED.

As yet very little effort is made in localities to restrict measles, as there is quite a prevalent but erroneous idea that measles is not a dangerous disease. The following are some important reasons which have led the Michigan State Board of Health to class measles, for the purpose of restriction, with "diseases dangerous to the public health": (1) it is a communicable disease and therefore preventable; (2) it causes more than two hundred deaths each year in Michigan; (3) it causes several thousands of cases of sickness each year; (4) it frequently injures or destroys the organs of sight or hearing of those who survive the disease; (5) it frequently prepares the way for and is closely followed by pneumonia and consumption*; (6) there is danger of measles becoming as prevalent in Michigan as it now is in England where it destroys more lives than diphtheria and scarlet fever combined.†

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* Atkinson, in Wood's Reference Handbook of the Medical Sciences, Vol. IV, p. 681; Quain, Dictionary of Medicine, p. 927; Ziemssen, Cyclopedia of the Practice of Medicine, Vol. II, pp. 102-106.

† According to the Fifty-first Annual Report of the Registrar-General, of Births, Marriages and Deaths in England, p. lii—during the 4 years, 1884-8, the average annual number of deaths, per million persons living, from scarlet fever and diphtheria combined was only 395, while from measles alone it was 577.

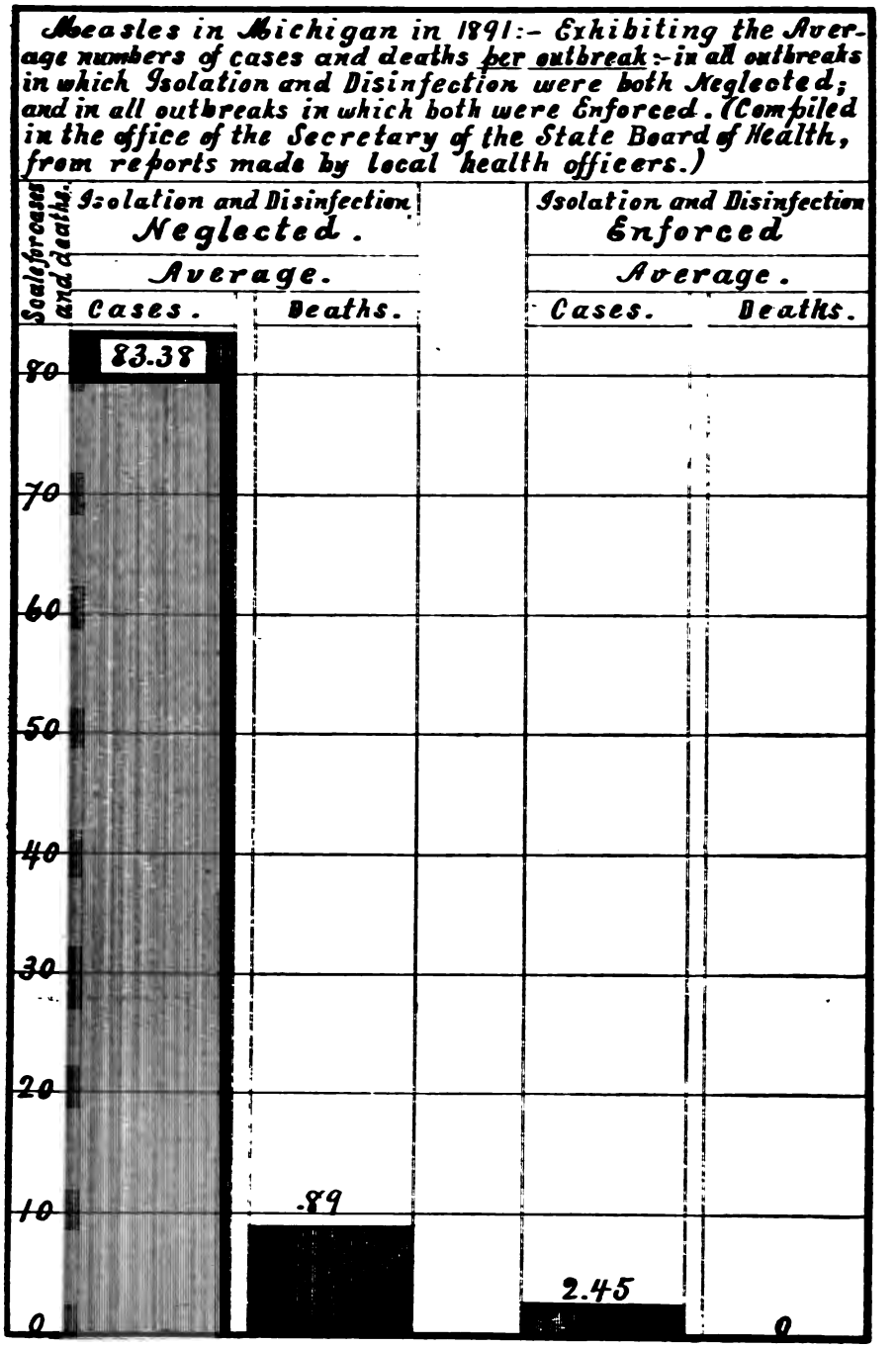
TABLE 2.—*Exhibiting the numbers of Outbreaks, Cases and Deaths from Measles in Michigan during the year 1891, and also the average numbers of Cases and Deaths per outbreak in each of the following groups of outbreaks: (1) All Outbreaks; (2) the 309 outbreaks in which Isolation or Disinfection or both were neglected or the statements were doubtful; (3) the 2 outbreaks in which only Isolation was enforced; (4) the 1 outbreak in which only Disinfection was enforced; (5) the 71 outbreaks in which both Isolation and Disinfection were neglected; and (6) the 11 outbreaks in which both Isolation and Disinfection were enforced.*

	(1) All outbreaks.*			(2) Isolation or Disinfection not mentioned or statements doubtful.			(3) Only Isolation enforced.			(4) Only Disinfection enforced.			(5) Isolation and Disinfection neglected.			(6) Isolation and Disinfection enforced.		
	Outbreaks.	Cases.	Deaths.	Outbreaks.	Cases.	Deaths.	Outbreaks.	Cases.	Deaths.	Outbreaks.	Cases.	Deaths.	Outbreaks.	Cases.	Deaths.	Outbreaks.	Cases.	Deaths.
Total	392	12,338	118	309	6,492	59	2	3	0	1	3	0	71	5,920	63	11	27	0
Average	----	31.47	.03	----	21.01	.19	----	1.50	0	----	3.00	0	----	83.38	.89	----	2.45	0

* The number of outbreaks, cases and deaths given in this column differ from those given in the first paragraph of this article, those from Detroit and Grand Rapids not being included in this table, because in those cities measles is present throughout the year, and as the reports are now made there is no way of distinguishing separate outbreaks.

As may be seen by Table 2, isolation and disinfection were reported to have been enforced in only 11 of the 392 outbreaks of measles; and these measures were both reported to have been neglected in 71 outbreaks. The difference, in favor of isolation and disinfection, is very marked,—the average number of cases per outbreak where isolation and disinfection were neglected having been 83.38 and the deaths .89; and in the 11 outbreaks where these measures were enforced the average number of cases was only 2.45, and there were no deaths. In two outbreaks isolation, only, was reported as having been enforced, and one outbreak disinfection, only, was reported as having been enforced. In the 309 outbreaks in the reports of which isolation or disinfection or both were not mentioned or the statements were doubtful, considerable effective work was apparently done in the way of isolation and disinfection. The result is seen by comparing the average numbers of cases and deaths in this "doubtful" column with those in the column headed "Isolation and Disinfection Neglected." In the "doubtful" column the average number of cases was only 21.01 and the deaths .19; in the "neglected" column the average number of cases was 83.38 and the deaths .89. In other words, there were nearly five times as many deaths and four times as many cases in those outbreaks known to be neglected, as in those outbreaks classed as "doubtful" because the reports were not sufficiently definite to be classed as certainly "isolated and disinfected." If in the 309 outbreaks in the "doubtful" column there had been no isolation or disinfection, it is probable that the average numbers of cases and deaths would have been about the same as in the 71 outbreaks in which both isolation and disinfection were known to have been neglected, or an average of 83.38 cases and .89 deaths per outbreak, or a total of 25,764 cases and 275 deaths in the 309 outbreaks. Taking from these the 6,492 cases and 59 deaths that occurred, there remain 19,272 cases and 216 deaths indicated as having been prevented by isolation and disinfection in these 309 outbreaks.

ISOLATION AND DISINFECTION RESTRICT MEASLES.



It is to be hoped that health officers will make all possible effort to get the people and attending physicians to coöperate with them in restricting measles by strict isolation and thorough disinfection.

The difference between isolation and disinfection and neglect of these measures is graphically shown in the diagram on page 220, in which the figures in four columns of Table 2 are exhibited according to a correct proportionate scale.

INFLUENCE OF AGE IN MEASLES.

The reports of local health officials in Michigan for the year 1891, gave the ages of 1,944 persons who were sick with measles, and of 28 persons who died of that disease. Table 3 represents, in certain age-groups, (1) the number of cases and (2) the number of deaths from measles; (3) the per cent that the cases in each group were of all cases of measles; (4) the per cent that the deaths in each group were of all deaths from measles; and (5) the per cent that the deaths in each group were of the cases in each group respectively,—compiled from all reports for the year 1891 which stated the ages.

By this table (3) it may be seen that the greatest proportion of cases of measles occurred in persons from 5 to 10 years of age,—over one-third (33.80 per cent) of all cases having occurred in that period of age. The next highest five-year period is the first five years of age, "0-5." From the second five-year period the numbers of cases grade downward, each succeeding period being lower than the preceding period.

The probable reason for the large proportion of cases in persons from 5 to 10 years of age is that a larger proportion of children commence going to school in that period than at any other (the schools being centers of infection in localities where cases of measles are not strictly isolated); and that a large proportion of persons in the later age-periods are protected by having had measles in earlier ages.

By Table 3 it may also be seen that the greatest proportion of deaths occurred in the first five-year period, 39.29 per cent of all deaths having occurred in that age-period; and of these five years the greatest proportion of deaths (17.9 per cent of all deaths from measles) occurred in the first year of age.

The last line of this table, giving the per cent the deaths in each group were of the cases in each group respectively, is perhaps the most important one. When the data for several years can be combined in a line like this, it will go far towards settling the question as to the age in which there is least danger of a case of measles proving fatal in Michigan. The data for the one year, 1891, indicate that there is greatest danger of a case proving fatal during the first five years of age, and that there is least danger from about 5 or 10 to 25 or 30 years of age,—the per cent of cases proving fatal having been: in children under 5 years of age, 2.54; in persons from 5 to 25, .96; and in persons of 25 years and over, 2.44.

There are two erroneous and very harmful beliefs, quite prevalent among parents,—that measles cannot ultimately be escaped any more than teething, and that the least dangerous time for persons to have the disease is while quite young children. Whatever ground there may be for these beliefs elsewhere, Table 2 and the diagram illustrative of it, and Table 3 of this article show that none exists in Michigan; but, that on the contrary, facts here bear evidence that measles is a preventable disease; and that it is *more* fatal to children under five years of age than to older persons.

TABLE 3.—*Exhibiting, in certain Age-Groups, the number of Cases and the number of Deaths from Measles; the per cent that the Cases in each group were of All Cases; the per cent that the Deaths in each group were of All Deaths; and the per cent that the Deaths in each group were of the Cases in that group.—Compiled from all reports for the year 1891 which stated the ages.*

	Number and per cent of Cases and Deaths in certain Age-groups.																		
Ages in Groups of Years	All Ages.	0–1.	1–2.	2–3.	3–4.	4–5.	0–5.	5–10.	10–15.	15–20.	20–25.	25–30.	30–35.	35–10.	40–45.	45–50.	50–55.	55–60.	Over 60.
No. of Cases	1,944	48	83	90	102	110	433	657	339	225	126	46	44	37	18	12	8	0	4
Per cent the cases in each group were of all cases	100	2.5	4.3	4.6	5.3	5.7	22.3	33.8	17.4	11.6	6.5	2.4	2.3	1.9	0.9	0.6	0.2	0	0.2
No. of Deaths	28	5	4	1	0	1	11	6	1	4	2	0	2	0	1	0	0	0	1
Per c't the deaths in each group were of all deaths	100	17.9	14.9	3.6	0	3.6	39.3	21.4	3.6	14.3	7.1	0	7.1	0	3.6	0	0	0	3.6
Per c't the deaths in each group were of cases in that group	1.4	10.4	4.8	1.1	0	0.9	2.5	0.9	0.3	1.8	1.6	0	4.5	0	5.6	0	0	0	25.0
		2.54						0.96				2.44							

SOURCE OF CONTAGIUM OF OUTBREAKS OF MEASLES.

Of the 394 outbreaks of measles reported to this office, as having occurred in the year 1891, the local health officials reported relative to the source of contagium in 253 of the outbreaks in ways which may be summarized as follows:—Traced to a former case, 103; probably traced to a former case, 30; unknown, 120; not reported, 141.

TABLE 4.—*Reported Source of Contagium of Outbreaks of Measles in Michigan during the year 1891.*

Source.	Numbers of Outbreaks.
Traced to a former case	103
Probably traced to a former case	30
Unknown (includes 1 reported "epidemic," 6 "exposure," 3 "sporadic")	120
Not stated	141
All outbreaks	394

TABLE 5.—*First, second and third localities, where the second locality was infected with measles from the first, and the third was infected from the second; and the numbers of cases and deaths from measles in the first, second and third localities. (Compiled from reports of health officers, who were able to trace the source of contagium to other localities.)*

Primary Localities from which Measles Spread.	In First Locality.		Secondary Localities Infected from Primary.	In Second Locality.		Tertiary Localities Infected from Secondary.	In Third Locality.	
	Cases.	Deaths.		Cases.	Deaths.		Cases.	Deaths.
Allegan county: Allegan village	*		Allegan county: Hopkins township	2	0			
Alpena county: Alpena city	*		Montmorency county: Hillman village	4	0			
Barry county: Hastings city	20	0	Barry county: Woodland township	29	0			
Berrien county: New Buffalo township	*		Berrien county: New Buffalo village	2	0			
Calhoun county: Albion city	18	0	Calhoun county: Clarence township	107	0			
			Hillsdale county: Litchfield township	8	0	Hillsdale county: Litchfield village	4	0
			Jackson county: Spring Arbor township	2	0			
Calhoun county: Battle Creek city	21	1	Allegan county: Martin township	3	0			
Clinton county: Ovid township	3	0	Clinton county: Ovid village	7	0			
Delta county: Escanaba city	1	0	Dickinson county: Felch township	20	0			
Genesee county: Flint city	21	0	Genesee county: Mundy township	50	0			
			Oakland county: Groveland township	1	0			
			Wayne county: Canton township	1	0			
Genesee county: Flint township	*		Genesee county: Clayton township	22	0			
Genesee county: Davison township	*		Genesee county: Richfield township	100	0			
Hillsdale county: Pittsford township	*		Hillsdale county: Hillsdale city	5	0			
Houghton county: Calumet township	17	0	Keweenaw county: Allouez township	120	4			
Ingham county: Lansing city	12	4	Eaton county: Bellevue township	46	0	Barry county: Barry township	50	0
			Kalamazoo county: Kalamazoo city	800	7	Hope township	61	1
						Van Buren county: Columbia township	108	0
Ionia county: Muir village	*		Ionia county: Ronald township	1	0			
Isabella county: Mt. Pleasant city	*		Osceola county: Evart township	12	0			

* This outbreak was not reported to this office by the health officer of the "first" locality at the time it occurred.

TABLE 5.—CONTINUED.

Primary Localities from which Measles Spread.	In First Locality.		Secondary Localities Infected from Primary.	In Second Locality.		Tertiary Localities Infected from Secondary.	In Third Locality.	
	Cases.	Deaths.		Cases.	Deaths.		Cases.	Deaths.
Jackson county: Jackson city	103	1	Jackson county: Concord township	3	0			
			Spring Arbor township	16	1			
Lake county: Cherry Valley townsh.	16	0	Lake county: Yates township	14	0			
Lenawee county: Cambridge township	9	1	Lenawee county: Clayton village	2	0			
			Rome township	8	0			
Lenawee county: Franklin township	122	0	Lenawee county: Tecumseh township	12	0			
Livingston county: Howell village	12	0	Livingston county: Cohoctah township	64	0			
Macomb county: Armada village	*	....	Macomb county: Richmond village	61	0	Sanilac county: Marion township	115	0
Manistee county: Manistee city	*	....	Manistee county: Manistee township	90	0			
Newaygo county: Fremont village	*	....	Newaygo county: Sherman township	100	1			
Oakland county: Milford village	*	....	Livingston county: Brighton village	160	0			
Ontonagon county: Ontonagon village	60	0	Ontonagon county: Rockland township	40	0			
Ottawa county: Grand Haven city	24	0	Ottawa county: Grand Haven township	20	0			
Roscommon county: Roscommon village	*	....	Roscommon county: Denton township	3	0			
Sanilac county	*	....	St. Clair county: Riley township	20	0			
Shiawassee county. Bancroft village	*	....	Shiawassee county: Perry village	1	0			
Shiawassee county: Owosso city	429	5	Kent county: Tyrone township	80	0			
			Livingston county: Tyrone township	60	0			
			Shiawassee county: Bennington township	15	0			
			Vernon village	2	0			
St. Clair county: Fair Haven township	*	....	Macomb county: New Baltimore village	20	0			
St. Clair county: Port Huron city	15	0	Sanilac county: Carsonville village	45	0			
Tuscola county: Denmark township	*	....	Tuscola county: Vassar village	2	0			
Wayne county: Detroit city	33	33	Macomb county: Lenox township	47	0	Macomb county: New Haven village	48	3
			Van Buren county: Arlington township	35	0			
Wanye county: Hamtramck townsh.	*	....	Macomb county: Warren township	100	0			

* This outbreak was not reported to this office by the health officer of the "first" locality at the time it occurred.

TABLE 5.—CONTINUED.

Primary Localities from which Measles Spread.	In First Locality. Cases.	In First Locality. Deaths.	Secondary Localities Infected from Primary.	In Second Locality. Cases.	In Second Locality. Deaths.	Tertiary Localities Infected from Secondary.	In Third Locality. Cases.	In Third Locality. Deaths.
Wayne county: Northville village	5	0	Oakland county: Pontiac city	1	0	Oakland county: Waterford township	2	0
Outside the State.								
Canada	----	----	Huron county: Hume township	3	0			
Chicago	----	----	Van Buren county: Geneva township	40	0			
Dakota	----	----	Hillsdale county: Reading township	100	0	Branch county: California township	3	0
						Hillsdale county: Camden township	15	0
Elkhart, Indiana	----	----	Berrien county: Benton Harbor city	112	0	Berrien county: Pipestone township	35	1
						Van Buren county: South Haven village	3	0
Lima, Indiana	----	----	St. Joseph county: Fawn River township	9	0			
			Sturgis village	5	0			
Indiana	----	----	Hillsdale county: Amboy township	11	0			
			Berrien county: St. Joseph township	130	3			
Minneapolis, Minnesota	----	----	Branch county: Coldwater city	3	0			
Ohio	----	----	Hillsdale county: Hillsdale city	1	0			
			Sanilac county: Bridgehampton village	4	0			
			Carsonville village	3	0			
Tennessee	----	----	Van Buren county: Hartford township	400	0			

PROPORTION OF MEASLES IN THE DIFFERENT MONTHS OF THE YEAR 1891.

Table 6 exhibits the proportion of measles reported in each month of the year 1891. The *first* line gives the per cent of all weekly postal-card *reports*, made by physicians in active general practice, which reported the presence of measles under their observation. The *second* line gives the average per cent of all these *reporters* who stated the presence of measles. The *third* line states the average order of prevalence of measles in the list of diseases reported. The *fourth* line represents the *prevalence* of measles, being a combination of the first and third lines of this table (the method of combining them is explained on pages 122-3 of the Annual Report of this Board for the year 1890). In this fourth line the smallest numbers indicate the greatest prevalence,—for instance, May is 1 or *first* in prevalence,—more measles in May than in any other month; April is 2 or *second* in prevalence; June is 3 or *third* in prevalence; and so on. The *fifth* line represents by months the number of outbreaks of measles reported to this office by health officers and clerks, including only the

reports which gave the dates of outbreaks,—reports of 62 outbreaks did not give dates and, of course, those outbreaks could not be included in this line.

The evidence in the various lines of this table (6) seems to indicate that in Michigan measles is most prevalent in the first half of the calendar year, the maximum occurring from March to June, and the minimum about September or October. But this evidence is only for a single year, and might, therefore, be exceptional. In Exhibit XX., page 134, of this Annual Report for 1892, is a statement of the average per cent of weekly card reports stating the presence of measles by months for the fourteen years, 1877-90, from which it appears that the maximum occurs in May, and the minimum in September and October.

TABLE 6.—*Measles in Michigan during the year 1891, exhibiting, by months, the per cent of all weekly card-reports received which stated the presence of measles; the average per cent of all observers reporting weekly who reported measles; the average order of prevalence of measles where it was present; and the number of outbreaks reported by health officers and clerks of local boards of health.*

1891.	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Per cent of weekly card reports stating presence of measles	10	8	12	24	28	23	18	9	5	1	1	1	1
Average per cent of observers who reported measles present	17	18	20	33	44	31	27	20	10	4	2	4	3
Average order of prevalence where present	3.0	3.2	3.6	3.1	3.2	2.3	2.4	3.3	3.4	3.3	1.0	2.5	2.7
Prevalence*	5	6	8	4	2	1	3	7	10	11	12	5	9
Outbreaks†	332	55	50	56	49	32	26	23	6	6	8	8	13

* Explained in the text accompanying this table.
† Relative to 62 outbreaks the date of occurrence was not given.

TYPHOID FEVER IN MICHIGAN.

DURING THE YEAR ENDING DECEMBER 31, 1891.

During the year ending December 31, 1891, there were reported to the Secretary of the State Board of Health 513 outbreaks of typhoid fever (includes "typho-malarial") in 501 localities in Michigan in which there were reported to have occurred 4,670* cases and 697 deaths. Notwithstanding the marked improvement which the State Board of Health has succeeded in bringing about both in promptness and accuracy of reports of local health officials to the central office, it is still evident that not all cases of, and deaths from, typhoid fever are yet reported. For the year 1891 there were reported to the Secretary of State 684† deaths from typhoid fever,—13 less than were reported to this office. The Secretary of the State Board of Health estimates that the deaths reported to the Secretary of State should be increased by about 40 per cent in order to equal the actual number of deaths which occur; according to this estimate there were about 958 deaths from typhoid fever in Michigan during the year 1891, instead of 697 as reported to the office of the State Board of Health.

TYPHOID FEVER IN 1891 COMPARED WITH PREVIOUS YEARS.

Comparisons with previous years, to ascertain the comparative increase or decrease of the prevalence of typhoid fever in this State, would, no doubt, be interesting and instructive, if there existed a fixed basis on which to found such comparisons; but from year to year there has been a steady improvement, both in the methods adopted by the State Board of Health in securing and compiling reports, and in the efforts made by the local health officials throughout the State to furnish in their reports the information desired by the State Board. It is, therefore, still impossible to determine the exact increase or decrease of prevalence of the disease in this State by comparisons of the numbers of outbreaks of the disease, and the cases and deaths reported to this office year by year. This fact should be borne in mind when referring to Table 1. By this table it may be seen

* The cases of typhoid fever were not reported for the city of Detroit, but the deaths were reported, and, by means of the ratio of deaths to cases in the rest of the State, the cases in Detroit were estimated to have been 409, and these are included in the 4,670 cases above given for the State.

† These 684 deaths do not include those reported as caused by typho-malarial fever while the 697 reported to this office include both those reported as caused by typhoid fever and typho-malarial fever.

TABLE 1.—TYPHOID FEVER.—*Exhibiting the number of Outbreaks, Localities, Cases and Deaths reported for each of the seven years, 1884-91; also for some of those years the average Cases and Deaths per Outbreak, the per cent ratio of Deaths to Cases, and the number of Special Final reports received.*

Year.	Outbreaks Reported.	Localities Reported.	Cases Reported.	Deaths Reported.	Average Cases per Outbreak.	Average Deaths per Outbreak.	Deaths per 100 Cases.	Final Reports Received.
1884	----------	245	969	290	----------	----------	27	----------
1885	218	200	715	194	3.28	.89	23	----------
1886	290	282	1,194	282	4.15	.75	18	60
1887	335	320	3,424	411	*7.24	*1.23	17	46
1888	316	296	1,511	310	4.78	.98	21	60
1889	432	398	2,530	402	†5.17	†.93	†18	115
1890	330	310	1,924	304	5.83	.92	16	135
1891	543	501	4,670	697	8.60	1.28	15	208

* The large average number of cases and deaths per outbreak in 1887 is partially accounted for by the act that in two outbreaks the disease became epidemic, resulting in an aggregate of 535 cases and 73 leaths.

† In computing the average numbers of cases and deaths per outbreak, and the per cent ratio of deaths o cases in 1889, the outbreak at Negaunee, in which 300 cases were reported, is omitted, because the umber of deaths which occurred in that outbreak was not reported.

hat there was a great increase in the reported number of cases of, and leaths from typhoid fever in Michigan during the year 1891. This may in part be accounted for by a greater number of the cases formerly reported as typho-malarial fever being now reported as typhoid fever, and by somewhat more complete reports of the outbreaks of typhoid fever hroughout the State; but it seems evident that these changes would not ccount for all of the very marked increase in 1891, indicated in Table 1, nd it seems probable that there was a considerable increase in the actual revalence of typhoid fever. Typhoid fever moves in waves, the principal aves appearing to occur about twelve years apart, with one or two minor aves intervening. This may be seen by referring to Table 2 and the ccompanying diagram, representing the number of deaths per 100,000 ersons living, which probably quite accurately represent the annual luctuations of, though not the total deaths from, typhoid fever in Michigan during the 24 years, 1868-91, as the system for collecting and compiling this information has remained practically the same throughout the 24 ears. It will be seen that this table (2) and accompanying diagram show n increase in 1891, compared with 1890, but no such marked increase ver preceding years as is shown in Table 1, some part of which apparent ncrease would appear to be due to the increased proportion of health fficers who report typhoid fever.

TABLE 2.—*Exhibiting the reported number of deaths from Typhoid Fever per 100,000 persons living in Michigan in each of the 24 years, 1868-91. Compiled from the Secretary of State's Vital Statistics of Michigan. (Population estimated by average annual increase, by Dr. Wilbur, Chief of Vital Statistics in State Department.)*

Year.	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.
Deaths	39.20	64.44	59.46	30.34	48.64	51.29	44.68	30.70	29.67	29.98	21.28	25.26
Year.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.
Deaths	32 07	52.66	21.41	24.92	28.41	20.85	26.22	39.40	32.06	31.15	22.21	31.97

Reported deaths from Typhoid fever in Michigan, 24 Years, 1868-91.

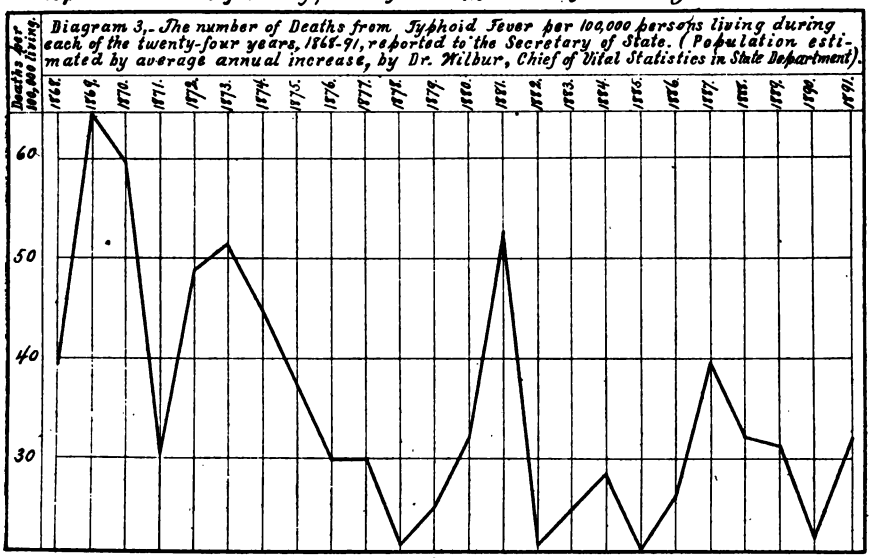


Diagram 3, graphically represents Table 3 which supplies the figures in detail

DISTRIBUTION OF TYPHOID FEVER BY COUNTIES, DURING 1891.

Table 3, and the map on pages 230 and 231 exhibit, in slightly different ways, the reported typhoid fever, by counties, in Michigan during the year 1891. The 15 counties from which there were reported the greatest number of cases of typhoid fever per 10,000 persons living, are, in the order of the greatest number of cases, as follows: Baraga, 933.8; Schoolcraft, 410.4; Marquette, 190.8; Iron, 108.6; Otsego, 88.8; Keweenaw, 87.1; Gogebic, 71.1; Houghton, 66.5; Ontonagon, 61.9; Missaukee, 59.3; Emmet, 45.7; Menominee, 38.4; Kalkaska, 37.2; Cheboygan, 31.1; Luce, 29.6; Oceana, 28.0. From the following 11 counties no cases of typhoid fever reported for the year 1891: Alcona, Alger, Arenac, Crawford, Isle Royal, Mackinac, Manitou, Montmorency, Ogemaw, Oscoda and Roscommon. The fact that no cases were reported does not make it certain, that there were no cases of typhoid fever in any of these 11 counties,—from two of them, Crawford and Ogemaw, deaths were reported to the Secretary of State for the year 1891.

TABLE 3.—*Numbers of Cases and Deaths reported from Typhoid Fever per 10,000 persons living in each County in Michigan during the year 1891. (Compiled from reports of Health Officers, Clerks, etc.)*

Counties.	Estimated* population of Michigan for 1891.	Number of reported		Number per 10,000 population, of		Counties.	Estimated* population of Michigan for 1891.	Number of reported		Number, per 10,000 population, of	
		Cases.	Deaths.	Cases.	Deaths.			Cases.	Deaths.	Cases.	Deaths.
State	2,189,584	4,670	697	21.8	3.3	Keweenaw	2,757	24	2	87.1	7.3
						Lake	6,832	1	1	1.5	1.5
Alcona	5,689	0	0	0	0	Lapeer	29,120	20	8	6.9	2.7
Alger	1,293	0	0	0	0	Leelanaw	8,113	11	1	13.6	1.2
Allegan	39,076	33	12	8.4	3.1	Lenawee	48,459	67	18	13.8	3.7
Alpena	16,260	15	4	9.2	2.5	Livingston	20,719	5	1	2.4	0.5
Antrim	10,931	3	1	2.7	0.9	Luce	2,701	8	0	29.6	0
Arenac	5,958	0	0	0	0	Mackinac	8,323	0	0	0	0
Baraga	3,159	295	26	933.8	82.3	Macomb	31,832	47	9	14.8	2.8
Barry	23,630	34	5	14.4	2.1	Manistee	25,400	31	6	12.2	2.4
Bay	58,538	158	44	27.0	7.5	Manitou	813	0	0	0	0
Benzie	5,417	6	0	11.1	0	Marquette	39,363	751	63	190.8	16.0
Berrien	41,735	71	17	17.0	4.1	Mason	17,017	28	12	16.5	7.1
Branch	26,676	43	5	16.1	1.9	Mecosta	20,269	18	3	8.9	1.5
Calhoun	44,006	40	3	9.1	0.7	Menominee	21,894	84	18	38.4	8.2
Cass	20,848	14	4	6.7	1.9	Midland	11,033	19	0	18.1	0
Charlevoix	10,143	6	2	5.9	2.0	Missaukee	5,398	32	8	59.3	14.8
Cheboygan	12,532	39	5	31.1	4.0	Monroe	32,209	4	2	1.2	0.6
Chippewa	12,696	8	1	6.3	0.8	Montcalm	32,586	10	7	3.1	2.1
Clare	7,895	3	1	3.8	1.3	Montmorency	1,636	0	0	0	0
Clinton	26,350	55	10	20.9	3.8	Muskegon	41,356	39	2	9.4	0.5
Crawford	3,142	0	0	0	0	Newaygo	21,055	19	10	9.0	4.7
Delta	16,182	10	1	6.2	0.6	Oakland	41,216	23	5	5.6	1.2
Dickinson	15,936	218	18	136.8	11.3	Oceana	16,098	45	5	28.0	3.1
Eaton	32,181	19	5	5.9	1.6	Ogemaw	5,953	0	0	0	0
Emmet	8,968	41	11	45.7	12.3	Ontonagon	3,875	24	0	61.9	0
Genesee	39,451	8	1	2.0	0.3	Osceola	15,015	8	1	5.3	0.7
Gladwin	4,516	9	1	19.9	2.2	Oscoda	2,048	0	0	0	0
Gogebic	14,483	103	9	71.1	6.2	Otsego	4,502	40	8	88.8	17.8
Gr'd Traverse	13,848	7	0	5.1	0	Ottawa	35,581	17	3	4.8	0.8
Gratiot	29,341	21	5	7.2	1.7	Presque Isle	4,844	2	0	4.1	0
Hillsdale	30,454	24	7	7.9	2.3	Roscommon	2,090	0	0	0	0
Houghton	36,681	244	20	66.5	5.5	Saginaw	84,591	63	18	7.4	2.1
Huron	29,391	18	5	6.1	1.7	Sanilac	33,214	84	16	25.3	4.8
Ingham	38,065	44	19	12.4	5.0	Schoolcraft	6,311	259	7	410.4	11.1
Ionia	32,694	29	5	8.9	1.5	Shiawassee	31,341	43	8	13.7	2.6
Iosco	16,059	21	9	13.0	5.6	St. Clair	52,696	65	8	12.3	1.5
Iron	4,420	48	10	108.6	22.6	St. Joseph	25,229	26	7	10.3	2.8
Isabella	19,447	18	4	9.3	2.1	Tuscola	33,185	26	7	8.1	2.1
Isle Royal	143	0	0	0	0	Van Buren	30,515	45	10	14.7	3.3
Jackson	45,331	73	15	16.1	3.3	Washtenaw	42,246	17	2	4.0	0.5
Kalamazoo	39,766	67	6	16.8	1.5	Wayne	266,181	†490	80	18.4	3.0
Kalkaska	5,382	20	2	37.2	3.7	Wexford	11,724	16	5	13.6	4.3
Kent	113,589	293	53	26.1	4.7						

* By Dr. C. L. Wilbur, Chief of Vital Statistics in Michigan "State Department."

† Cases for the city of Detroit estimated from the deaths as the cases were not reported. The estimate was made by using the ratio of cases and deaths in the rest of the State.

Distribution of Typhoid Fever reported in Michigan in 1891.*
LAKE SUPERIOR
LAKE MICHIGAN
LAKE HURON
LAKE ERIE
WISCONSIN
ISLE ROYAL
KEWEENAW
HOUGHTON
ONTONAGON
BARAGA
MARQUETTE
GOGEBIC
IRON
DICKINSON
MENOMINEE
ALGER
LUCE
CHIPPEWA
SCHOOLCRAFT
MACKINAC
DELTA
MANITOU
EMMET
CHEBOYGAN
PRESQUE ISLE
CHARLEVOIX
ANTRIM
OTSEGO
MONTMORENCY
ALPENA
GRAND TRAVERSE
KALKASKA
CRAWFORD
OSCODA
ALCONA
BENZIE
LEELANAU
WEXFORD
MISSAUKEE
ROSCOMMON
OGEMAW
IOSCO
MANISTEE
MASON
LAKE
OSCEOLA
CLARE
GLADWIN
ARENAC
HURON
OCEANA
NEWAYGO
MECOSTA
ISABELLA
MIDLAND
BAY
TUSCOLA
SANILAC
MUSKEGON
MONTCALM
GRATIOT
SAGINAW
KENT
IONIA
CLINTON
SHIAWASSEE
GENESEE
LAPEER
ST. CLAIR
OTTAWA
ALLEGAN
BARRY
EATON
INGHAM
LIVINGSTON
OAKLAND
MACOMB
VAN BUREN
KALAMAZOO
CALHOUN
JACKSON
WASHTENAW
WAYNE
BERRIEN
CASS
ST. JOSEPH
BRANCH
HILLSDALE
LENAWEE
MONROE
* By Counties, the reported Cases and Deaths per 10,000 Inhabitants.
L.= Localities: O.= Outbreaks: C.= Cases per 10,000 population: D.= Deaths per 10,000 population

TYPHOID FEVER IN EACH MONTH OF THE YEAR 1891.

TABLE 4.—*Exhibiting the reported number of outbreaks of Typhoid Fever which Began, the number which Ended, and the number of outbreaks which were Present, in each month of the year 1891, in the different local jurisdictions of Michigan.*

Outbreaks reported in different localities.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Number began.....	28	13	10	11	18	21	33	90	84	85	39	16	448
Number ended.....	11	9	10	3	8	14	3	21	40	72	90	83	364
Number present.....	30	37	32	35	50	66	76	162	217	249	199	126	.....

The last line of figures, in Table 4, representing the reported number of outbreaks present, is not derived from the preceding two lines, as might be supposed, but is obtained by actual count of the number of outbreaks reported as existing in each month. Frequently the time of the beginning of an outbreak is reported, but the time of the ending of the outbreak is not reported; and sometimes the month in which the outbreak ended is given without giving the date of the beginning of the outbreak. In either case the outbreak may have begun and ended in the same month, or it may have extended through several months. There were 84 more beginnings than endings, of outbreaks, reported during the year 1891.

TABLE 5.—*Exhibiting the Number and Per Cent of Cases of Typhoid Fever in Michigan in each Month during the Year 1891. (Includes each case for which, the time during which it existed, was stated in the reports. Each of such cases is counted in each month in which, or part of which, the case was reported to have existed.)*

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Number cases present.....	84	35	13	22	24	31	71	208	353	344	192	87
Per cent of cases present..	6	2	1	2	2	2	5	14	24	23	13	6

SOURCE OF CONTAGIUM OF TYPHOID FEVER.

TABLE 6.—*Exhibiting the reported "Source of Contagium" of cases of Typhoid Fever in Michigan during the year 1891.*

Reported Sources.	Number of cases.
Traced to former cases	322
Probably traced to former cases	2
Attributed to infected, contaminated, or surface water	1,477
Attributed to drinking infected, or impure milk	8
Cases reported as coming from outside jurisdictions	192
Attributed to defective sewerage, or drainage	44
Attributed to filthy or unsanitary conditions	117
Attributed to going in swimming, and going in water	2
Attributed to stagnant water	9
Attributed to malaria	8
Attributed to overwork	3
Attributed to *La Grippe*	3
Attributed to taking cold	2
Cases reported as "sporadic"	9
Cases reported to have arisen *De Novo* (1 "spontaneous," and 6 "local")	18
Cases, the sources of contagium of which, were reported as unknown	560
Cases, the sources of contagium of which, were not reported, or the statements were too indefinite for classification	1,894
Total	4,670

Outbreaks Traced to Former Cases of Typhoid Fever.

The following representative statements from the reports of some of the health officers, who were able to trace the outbreaks of typhoid fever, in their respective jurisdictions, to cases of the disease, outside of their jurisdictions,—with the name of the health officer, and of the jurisdiction subjoined:—

"Case No. 1 was exposed at his home in Cleveland. * * * Came down with the disease upon arrival here."—*Leon A. Warsabo, M. D., Coldwater.*

"The patient was, from her home here, visiting friends in the northern part of the State, where typhoid prevailed. The patient returned home with the disease upon her."—*Frank A. Foster, M. D., South Arm township, Charlevoix county.*

"Patient attended a typhoid case in the village of Stockbridge."—*G. A. Rowe, M. D., Stockbridge township, Ingham county.*

"Attended a typhoid patient in Waterloo township, Jackson county."—*G. A. Rowe, M. D., Stockbridge township, Ingham county.*

"By a lady from an infected village, Alabaster."—*George S. Darling, M. D., Tawas City.*

"Taken from R— C—— at Schoolcraft."—*H. C. Ames, Portage township, Kalamazoo county.*

"From attending cousin sick with same disease."—*Aaron Clark, M. D., Cannon township, Kent county.*

"Contracted at Bessemer city, Michigan,—had been living with persons, who were stricken with same trouble."—*N. D. Kean, M. D., Tilden township, Marquette county.*

"Nursing a case of typhoid fever in Howell village."—*Wm. H. Erwin, M. D., Cohoctah township, Livingston county.*

Outbreaks Traced to Outside Jurisdictions.

The following are extracts from some representative reports of health officers, who were able to trace the source of contagium of outbreaks, in their jurisdictions, to outside jurisdictions,—with the name of the health officer, and the place of his jurisdiction subjoined:—

"Patient came home from Grand Rapids sick with the fever. Had been at work there."—*A. H. Wicks, M. D., Hopkins township, Allegan county.*

"This case came from Chicago in the second week of the disease."—*H. V. Tutton, M. D., Benton Harbor.*

"He contracted his fever in Chicago."—*W. C. Ransom, M. D., (attending physician), Ganges township, Allegan county.*

"Contracted in Benton Harbor."—*Talma Hendrick, Hagar township, Berrien county.*

"From Dakota. The young man had been out there threshing."—*Hiram B. Wilcox, M. D., Three Oaks village, Berrien county.*

"The patient was taken sick at Boston, and was brought home to his parents."—*Leon A. Warsabo, M. D., Coldwater.*

"Patient came from Chicago while feeling bad, and while here came down with typhoid fever."—*Wm. L. Ford, M. D., Coldwater.*

"A commercial traveler who was taken sick in Chicago."—*A. G. Bruce, M. D., Albion.*

"Brought by the patient, a brakeman, from Michigan City, Indiana."—*W. H. Titus, M. D., Ontwa township, Cass county.*

"Brought from Durand, Michigan."—*Charles E. Knapp, M. D., Maple Rapids village, Clinton county.*

"A young man came from Lansing suffering from this disease."—*James E. Taylor, M. D., Ovid village, Clinton county.*

"A dining-room girl came home sick from St. Johns, Clinton county."—*James E. Taylor, M. D., Ovid township, Clinton county.*

"Came home sick from the city of Petoskey."—*Andrew Luesing, Carp Lake township, Emmet county.*

"Came from Detroit sick and in a week he died."—*Howard Carey, M. D., Sand Beach township, Huron county.*

"Patient came from Washington (State). Was taken sick on his way here."—*Arthur W. Saxton, M. D., Henrietta township, Jackson county.*

"He was brought to his mother's after taken sick in Charleston township."—*O. F. Burroughs, M. D., Comstock township, Kalamazoo county.*

"Disease was contracted at Belding, Michigan, and patient coming home contaminated the water."—*J. B. Dewar, M. D., Cedar Springs village, Kent county.*

"Patient contracted the disease in Grand Rapid, and came to her home in Ada."—*L. F. Van Amburg, M. D., Ada township, Kent county.*

TABLE 7.—*First, second and third Localities, where the second Locality was infected with Typhoid Fever from the first, and the third was infected from the second; and the number of Cases and Deaths from Typhoid Fever in the first, second and third Localities. (Compiled from reports of health officers who were able to trace the source of contagium to other localities.)*

Primary Localities from which Typhoid Fever Spread.	In First Locality.		Secondary Localities Infected from Primary.	In Second Locality.		Tertiary Localities Infected from Secondary.	In Third Locality.	
	Cases.	Deaths.		Cases.	Deaths.		Cases.	Deaths.
Allegan county: Leighton township	*		Allegan county: Dorr township	1	1			
Alpena county: Alpena city	15	4	Sanilac county: Bridgehampton tp.	8	2			
Baraga county: Baraga village	250	20	Marquette county: Michigamme township	38	3			
Baraga county: L'Anse Bay	*		Ontonagon county: Ontonagon village	9	0	Ontonagon county: Greenland township	8	0
Calhoun county: Battle Creek city	23	0	Barry county: Assyria township	4	0			
Clinton county: St. Johns village	18	5	Clinton county: Ovid township	1	0			
Eaton county: Charlotte city	2	1	Shiawassee county: Woodhull township	1	0			
Eaton county: Grand Ledge village	*		Oakland county: Farmington village	1	0			
Emmet county: Petoskey village	*		Emmet county: Carp Lake township	3	0			
Genesee county: Flint city	*		Saginaw county: Birch Run township	1	0			
Gogebic county: Bessemer city	*		Marquette county: Tilden township	3	0			
Gogebic county: Ironwood city	3	1	Ontonagon county: Rockland township	2	0			
Houghton county: Dollar Bay, Osceola township	*		Houghton county: Red Jacket village	6	1			
Houghton county			Keweenaw county: Allouez township	1	0			
Huron county: Brookfield township	3	1	Huron county: Oliver township	2	1			
Ingham county: Lansing city	7	7	Clinton county: Ovid village	2	0	Jackson county: Springport township	1	0
			Eaton county: Potterville village	1	0			
			Shiawassee county: Woodhull township	1	0			
Ingham county: Stockbridge village	3	0	Ingham county: Stockbridge township	1	1			
Ionia county: Belding, Otisco township	3	1	Kent county: Cedar Springs village	2	0			
Iosco county: Alabaster village, Alabaster township	15	8	Iosco county: Tawas City village	1	0			

* This outbreak was not reported to this office by the Health Officer of the "first" locality at the time it occurred.

TABLE 7.—CONTINUED.—*Movement of infection.*

Primary Localities from which Typhoid Fever Spread.	In First Locality.		Secondary Localities Infected from Primary.	In Second Locality.		Tertiary Localities Infected from Secondary.	In Third Locality.	
	Cases.	Deaths.		Cases.	Deaths.		Cases.	Deaths.
Isabella county: Mt. Pleasant city	4	0	Isabella county: Deerfield township	1	0			
Jackson county: Parma village	10	1	Jackson county: Concord township	5	1			
Jackson county: Waterloo township	2	1	Ingham county: Stockbridge township	1	0			
Kalamazoo county: Charleston township	----	----	Kalamazoo county: Comstock township	2	0			
Kalamazoo county: Schoolcraft village	1	1	Kalamazoo county: Portage township	10	0			
Kalkaska county	----	----	Grand Traverse county: Whitewater township	4	0			
Kent county: Grand Rapids city	252	45	Allegan county: Hopkins township	3	0	Clinton county: Ovid township	1	0
			Clinton county: Ovid village	4	0			
			Ovid township	1	0			
			Jackson county: Columbia township	1	0			
			Kent county: Ada township	1	0			
			Oakland county: Rose township	11	1			
			Ottawa county: Blendon township	1	1			
Lenawee county: Adrian city	30	3	Lenawee county: Blissfield township	10	3			
Lenawee county: Deerfield township	*	----	Lenawee county: Deerfield village	7	6			
Livingston county: Howell village	*	----	Livingston county: Cohoctah township	2	0			
Macomb county: Utica village, Shelby township	*	----	Oakland county: Troy township	1	0			
Marquette county: Negaunee city	58	7	Marquette county: Humboldt township	1	0			
Marquette county	----	----	Houghton county: Torch Lake township	48	3			
Mason county	----	----	Shiawassee county: Venice township	2	0			
Mecosta county: Big Rapids city	12	2	Mecosta county: Green township	1	0			
Missaukee county	----	----	Wexford county: Colfax township	2	1			
Montcalm county: Pierson village	*	----	Kent county: Plainfield township	9	2			
Muskegon county: Muskegon city	26	?	Montcalm county: Howard City village	3	2			

* This outbreak was not reported to this office by the Health Officer of the "first" locality at the time it occurred.

TABLE 7.—CONTINUED.—*Movement of infection.*

Primary Localities from which Typhoid Fever Spread.	In First Locality.		Secondary Localities Infected from Primary.	In Second Locality.		Tertiary Localities Infected from Secondary.	In Third Locality.	
	Cases.	Deaths.		Cases.	Deaths.		Cases.	Deaths.
Newaygo county: Hesperia village	2	2	Newaygo county: Denver township	1	1			
Ontonagon county	----	----	Isabella county: Isabella township	4	2			
Osceola county: Reed City village	*	----	Osceola county: Lincoln township	2	0			
Oscoda county: Loud's lumber camp	*	----	Iosco county: Tawas City village	1	0			
Saginaw county: Saginaw city	14	3	Clinton county: Maple Rapids village	1	0			
Saginaw county: Saginaw city	----	----	Ingham county: Vevay township	10	1			
			Saginaw county: Birch Run township	1	0			
Shiawassee county: Durand village	1	1	Clinton county: Maple Rapids village	1	0			
Shiawassee county: New Lathrop, Hazleton township	13	3	Saginaw county: Birch Run township	1	0			
St. Clair county: Port Huron city	*	----	Sanilac county: Fremont township	3	0			
			Marion township	6	2			
Tuscola county: Easy, Dayton township	6	3	Lapeer county: Rich township	4	1			
Tuscola county: Vassar village	*	----	Grand Traverse county: Paradise township	1	0			
Washtenaw county: Ann Arbor city	1	0	Houghton county: Torch Lake township	1	0			
Wayne county: Detroit city	73	61	Cheboygan county: Mackinaw City village	9	2			
			Huron county: Sand Beach township	4	2			
			Macomb county: Warren township	2	2			
			Monroe county: Exeter township	1	0			
			Shiawassee county: Fairfield township	4	0			
			Washtenaw county: Ypsilanti city	2	0			
			Wayne county: Livonia township	7	0			
			Plymouth village	4	2			
"North part of State"	----	----	Branch county: Bethel township	2	0			
Upper Peninsula	----	----	Ingham county: Onondaga township	1	1			
			Montcalm county: Pine township	1	1			

* This outbreak was not reported to this office by the Health Officer of the "first" locality at the time it occurred.

TABLE 7.—CONTINUED.—*Movement of infection.*

Primary Localities from which Typhoid Fever Spread.	In First Locality.		Secondary Localities Infected from Primary.	In Second Locality.		Tertiary Localities Infected from Secondary.	In Third Locality.	
	Cases.	Deaths.		Cases.	Deaths.		Cases.	Deaths.
(*Outside of Michigan.*)								
Dakota	----	----	Berrien county: Three Oaks village	1	0			
			Ingham county: Aurelius township	1	1			
			Allegan county: Ganges township	1	0			
			Berrien county: Benton Harbor city	1	0	Berrien county: Hagar township	5	2
			Branch county: Coldwater city	1	0			
			Calhoun county: Albion city	1	1			
Illinois: Chicago	----	----	Albion city	1	0			
			Macomb county: Ray township	2	2			
			Rome village	1	1			
			Shiawassee county: Perry township	1	0			
			Van Buren county: Geneva township	2	1			
			Lawrence township	2	1			
			South Haven village	5	2			
			South Haven township	1	0			
Illinois: Hammond	----	----	Calhoun county: Tekonsha village	1	1			
Indiana	----	----	Allegan county: Monterey township	4	2			
			Washtenaw county: Manchester village	5	0			
Indiana: Fort Wayne	----	----	St. Joseph county: Centreville village	6	1			
Indiana: Michigan City	----	----	Cass county: Ontwa township	1	0			
Indiana: Whiting	----	----	Hillsdale county: Moscow township	4	0			
Massachusetts: Boston	----	----	Branch county: Coldwater city	1	0			
New York State	----	----	Allegan county: Casco township	2	2			
Ohio: Cleveland	----	----	Branch county: Coldwater city	2	0			
Ohio: Toledo	----	----	Lenawee county: Hudson village	1	0			
Ontario: Sandwich	----	----	Kent county: Cannon township	3	0			
Ontario: Near Mouth of Thames	----	----	Wayne county: Trenton village	1	0			
Washington State	----	----	Jackson county: Henrietta township	2	0			
Wyoming	----	----	Calhoun county: Tekonsha village	2	0			

Outbreaks Attributed to Infected, Contaminated or Impure Water.

The following are extracts from reports by a few of the health officials, who attributed the cause of 1,477 cases of typhoid fever, in their jurisdictions, to infected, contaminated, impure, or surface water,—with the name of the health officer (or other health official), and the name of the jurisdiction subjoined:—

"For four days before, the child had been drinking surface water from Green Lake, Leighton township, Allegan county."—*Victor V. Bacon, M. D., Dorr township, Allegan county.*

"The [water-works] plant is located on the lowest ground in the village, and, as a means of reserve, a large well was dug to the depth of 50 feet and bricked up. Through this brick work at varying depths are streams of water that gain entrance and are the source of the infection for our village water."—*Henry Palmer, M. D., St. Johns village, Clinton county.*

"Drinking impure water in the majority of the cases."—*A. J. Braden. M. D., Baraga village, Baraga county.*

"From impure water taken from well near house."—*Orson Swift, Maple Grove township, Barry county.*

"Surface water and neglect of common sanitary laws."—*Alex. M. Richey, Lake township, Benzie county.*

"The family were the only ones affected. They used water out of a wet-weather spring, or a hole in the ground, that was impure."—*S. A. Work, M. D., Calvin township, Cass county.*

"Impure water."—*George M. Bell, M. D., Benton township, Berrien county.*

"Through drinking water,—the drainage of cess-pools into open well."—*John P. Fourst, Marcellus, Cass county.*

"These three men were working on a contract of building county road, drinking water where they had made a ditch along side of road, in black muck swamp. All seemed to get it from same source."—*John S. Brown, Maple Ridge township, Delta county.*

"Contaminated water-supply."—*L. W. Gardner, M. D., Little Traverse township, Emmet county.*

"Contaminated drinking water."—*E. Meyers, M. D., Iron Mountain.*

"Attributed to a long drought and low water in the bay, from which most all the inhabitants got their drinking water."—*Benj. F. F. Stingerland, Alabaster township, Iosco county.*

"Drinking impure water from another jurisdiction."—*J. C. Gauntlett, M. D., Whitewater township, Grand Traverse county.*

The cause of 10 cases was "contaminated drinking water."—*E. H. Pomeroy, M. D., Calumet township, Houghton county.*

"Bad water taken from a swamp."—*Nelson Stevens, Clerk, Wilber township, Iosco county.*

"From bad water at the railroad camps."—*B. C. Shaw, M. D., Isabella township, Isabella county.*

"Family came from Sandstone township and claimed it was caused by drinking water from S——'s well in Parma."—*Wm. M. Keeler, M. D., Concord township, Jackson county.*

"From drinking water from well located near a water closet."—*L. H. Shank. M. D., Empire township, Leelanaw county.*

"From drinking water from an old cistern."—*C. A. Norconk, M. D. Bear Lake township, Manistee county.*

"Return of patient from working in the water,—drank river water."—*Ezera J. Chaffee, Sheridan township, Mecosta county.*

"From a well that became contaminated by filtration from a barn yard."—*E. Erskin, M. D., Rogers City village, Presque Isle county.*

"I believe all the cases were caused by the water supply, as most all the water used by these patients was surface water."—*D. D. McNaughton, M. D., Argyle township, Sanilac county.*

"Drinking water from cistern in cellar and infected stream."—*Frank Rainie, M. D., Manistique village Schoolcraft county.*

"Contaminated water supply."—*James A. Watson, M. D., Brown City village, Sanilac county.*

"Impure drinking water,—contaminated with sewage."—*Wm. K. Moore, M. D., Algonac village, St. Clair county.*

"Drinking water, from bay, contaminated by sewage from hotel."—*Wm. K. Moore, M. D., Clay township, St. Clair county.*

"A young man came home sick, from a lumber camp in Missaukee county, by the use of impure water out of a swamp."—*John Goldsmith, Colfax township, Wexford county.*

"By having filth, wash in, and drain into a creek, from which water was used for a camp."—*Neal D. Ford, South Branch, Wexford county.*

The following is quoted from a letter, of September 3, from C. H. Dale, M. D., health officer of the village of Springport, relative to the cause of typhoid fever in his jurisdiction:—

"F—— P——, the typhoid patient, I reported some days ago, has convalesced, but a Mrs. H—— is reported dead, in the same neighborhood, with typhoid fever. This patient used water from P——'s well. In 1888 a lady died with same disease; she used the same water. In 1889 a boy, also died with the disease, who also used the same well water. In my opinion, this well of water, is the cause of the typhoid in this neighborhood. I will send you a sample of the water for analysis if you desire."

The following reply was sent September 4:—

"DR. C. H. DALE, *Springport, Michigan:*

"DEAR SIR:—Accept cordial thanks for your letter of September 3, relative to typhoid fever in the village and township of Springport.

"The Laboratory of Hygiene, at Ann Arbor, is not now in operation,—will not be until the middle of September. I do not see that we can do anything with the water. I am sorry. Perhaps it can be done later if the typhoid continues; but the water from that well ought not to be used except after boiling.

Very respectfully,

HENRY B. BAKER, *Secretary.*

Influence of Improved Water-supply on Typhoid Sickness-rate.

The following extract from a report, of December 22, 1890, by E. H. Pomeroy, M. D., health officer of Calumet township, Houghton county, shows the influence of water-supply on typhoid sickness-rates:—

"Some interesting points have come to notice regarding somewhat of an epidemic of typhoid fever, which abated on the advent of cold weather. The points are upon the effects of drinking water in the propagation of the disease. The Calumet and Hecla Mining Co., have a system of water works, by which water from Lake Superior is furnished all the families on the mining location, and to the village of Red Jacket, which is entirely surrounded by the mining location. Calumet village is on high and rolling ground immediately adjoining the mining location on the east, but without the water privileges of the mining location. Calumet village has a population of about 1,000 people. Red Jacket has a population of about 3,000. The mining location has a population of about 8,000. Blue Jacket is a local designation of one portion of the mining location, and there are in Blue Jacket about 700 people. During the year 1889, without the benefit of the Lake Superior water privilege there were 14 cases of typhoid fever in Blue Jacket. During the year 1890, with the Lake Superior water privilege there has been but one case. In Red Jacket there have been three cases. On the mining location, including Blue Jacket, there have been 18 cases. In Calumet village there have been 51 cases. In the Blue Jacket case, the disease was contracted, while the person was visiting at another house, on the location where others had the disease, and where water was used from a well which was subsequently condemned, an analysis of the water showing it unfit for culinary or drinking purposes. Nearly all the cases, on the mining location, were developed in houses where well water was used during the warmest weather, on account of the well water being colder than the Lake Superior water and, perhaps, because the wells were more convenient than the hydrants. Of the entire 72 cases, only one, was believed to have adhered to the use of Lake Superior water for both drinking and culinary purposes."

That is to say: 11,000 inhabitants, with Lake Superior water to drink and use, had only 21 cases of typhoid fever, which is about 1.99 per 1,000 inhabitants, while 1,000 inhabitants of adjoining territory, without Lake Superior water, had 51 cases of typhoid fever, or 26 times as many, proportionately, as in the part supplied by pure water.

Outbreaks Attributed to Infected Milk.

"Reported that he stopped at a farm house in Indiana and bought a glass of milk where, he afterwards learned, they had typhoid fever."—*M. A. Powell, Monterey township, Allegan county.*

"All these families are using the milk of one cow, which has access to water only in a swamp on the island. We were all satisfied that the source of the fever is in this milk."—*E. P. Christian, M. D., (attending physician), Monguagon township, Wayne county.*

Outbreaks Attributed to Defective Sewerage and Drainage.

"Choked sewer and privy-vault under patient's window."—*H. J. Chadwick, M. D., Hart village, Oceana county.*

"Bad sewerage."—*J. J. Hirst, Albee township, Saginaw county.*

"Poor drainage."—*O. A. Eaton, M. D., Custer township, Mason county.*

"Source of contagium supposed to be [defective?] drainage in the typhoid fever cases."—*Alfred A. Guck, Clerk, Schoolcraft township, Houghton county.*

Outbreaks Attributed to Filth.

"Believed to be filth surrounding house and well."—*George A. Rowe, M. D., Stockbridge township, Ingham county.*

"Lack of cleanliness in regard to barn-yard and privy-vault."—*F. N. Turner, M. D., Webberville village, Ingham county.*

"Outbreak in a family of three brothers, who live by themselves, and in a very filthy manner."—*W. F. Stringham, Shelby township, Oceana county.*

"Vitiated environment which required cleansing before the disease could be stayed; but after thorough disinfection the epidemic ceased."—*John W. Cooper, Wyoming township, Kent county.*

"By filth around Thayer Lumber Company's lumber camp."—*James Roberts, Forest township, Missaukee county.*

SOME SEVERE OUTBREAKS OF TYPHOID FEVER.

During the year 1891 a number of severe outbreaks of typhoid fever occurred in this State,—some of them unusually severe, as in the case of the outbreak in the village of Baraga, in which there were reported to have occurred 250 cases and 20 deaths, and in the outbreak in the city of Ishpeming, in which there were reported to have occurred 403 cases and 31 deaths.

Most of these severe outbreaks occurred in the Upper Peninsula of Michigan, and some of them seem to have originated from infected railroad-construction camps along the Huron Bay and Iron Range Railroad. The employés at these camps were largely foreigners. As the camps were in new and unsettled districts, and as the railroad company had neither hospitals nor physicians, when the disease broke out in the camps the stricken employés, when possible, made their way to the nearest villages and cities, where the services of physicians could be obtained. These camps having become severely infected were thus a constant source of infection and reinfection of the neighboring villages and cities. The fact that these were new and rapidly growing villages and cities of the Upper Peninsula, that their populations were largely foreigners ignorant of sanitation, that as a rule these cities and villages are not yet provided with safe water-supplies and systems of sewerage, and the fact that they were constantly being reinfected from those infected railroad-construction camps, devoid of all sanitary provisions, probably accounts for the severity of these particular outbreaks.

Outbreak of Typhoid Fever in Champion Township.

An outbreak, traceable to an infected railroad-construction camp, occurred in Champion township, Marquette county, in which there were reported to have been 88 cases and 13 deaths from July 20, 1891, to February 1, 1892. From a letter of September 3, 1891, from Isadore Freund, M. D., health officer of the township, the following is extracted:—

"In our neighborhood is being constructed a new railroad [Huron Bay and Iron Range] employing a large foreign population, and from this source is being distributed in this and in neighboring townships employés sick with typhoid fever. These men are destitute owing to financial complication of the road. Our county has no general hospital for the care of such cases, and they become charges upon the respective townships.

"In our case, in view of this alarming source of infection, I have by permission of the company I represent, taken these cases, as fast as found, into our company hospital, and, when this was full, converted an adjoining building into fever wards, which so far have cared for 30 cases, and will probably be sufficient for future purposes. The danger is of course to the homes of those who receive the sick before we see them. We disinfect the vaults and premises, and take away the patients, and so far have only 3 or 4 outside cases, and in every instance traced to such source. We realize that though unusual care is taken to prevent it, the possibility of a general epidemic of typhoid fever is not very remote."

Outbreak of Typhoid Fever in Michigamme Township.

July 4, 1891, typhoid fever broke out in the township of Michigamme, Marquette county, and continued until in November, during which time there were reported to have occurred 38 cases and 3 deaths from this disease, and it seems probable, that many occurred at railroad camps, which were not reported. August 25, 1891, Dr. James R. Humphrey, health officer of the township, wrote this office as follows:—

"On the line of a new railroad [Huron Bay & Iron Range] now being built from Champion, Marquette county, to Arvon, Baraga county, there is, and has been for some weeks, an outbreak of typhoid fever. From this source nearly all of the cases occurring in this and Champion townships, have come. It has not been limited to any particular camp along the line. A hundred cases would, probably, not be an over-estimate of the outbreak.

"The road is now said to be nearly completed and some of the camps are being broken up; so that there may not be any further serious trouble from it. The railroad company has not a physician or a temporary hospital along the line, and those taken sick are compelled to leave the camps, often without the money due them, without friends, and without a place to go to. It is a burning shame that men should be treated in such a manner; but there seems to be no law to compel a company to do otherwise, so far as I know. This county, and Baraga, are doing what they can to take proper care of the destitute cases, but with only partial success."

In response, the Secretary of this Board sent the following, August 31:—

"DEAR SIR:—Please accept thanks for your letter of August 25, relative to typhoid fever.

"I can find no law which compels railroad companies to care for the persons sick with a dangerous communicable disease, in their employ; but sections 1647 and 1648, Howell's Statutes, (sections 59 and 60, page 18 of the 'Laws of the State of Michigan relating to the Public Health,' a copy of which was sent to you, about June 1, 1891), provides that 'the *board of health of the township* where such person may be, *shall* make effectual provision, in the manner in which they shall judge best for the safety of the inhabitants' of the township, by removing such sick person 'to a separate house, if it can be done without danger to his health, and by providing nurses,' etc., which shall be done *at the expense of the county, provided* the person sick, or those liable for his support are not able to pay the charges for such care."

November 9, 1891, Dr. Humphrey again wrote this Office, as follows:—

"In reply to your card of the fifth, in regard to an outbreak of typhoid fever reported by me August 29, I have to say, that we yet have a few straggling cases. How many cases have occurred in this township (Michigamme) it is impossible to tell, as most of the cases were amongst laborers, along the Huron Bay & Iron Range railroad. Many of them sickened in the camps, some of them remaining without medical attention, but the majority finding their way to this and other points, where they were looked after at the expense of the county, provided they had no means. From that source, and from the village, there have been under my care here 38 cases with 3 deaths, one of the fatal cases being complicated with diphtheria toward the end. The only means employed to prevent the spread of the disease has been disinfection of the recent stools, and the privy (with chloride of lime), cleanliness, and directions to boil the drinking

water. In houses where cleanliness could not be had I have, in two instances, seen every evidence of direct contagion; and in two cases I have reason to believe the disease was conveyed by contamination of the water-supply, through a privy where typhoid stools had been thrown. At present there is only one case of the disease under treatment, and 5 others well on in convalescence."

Outbreak of Typhoid Fever in Ishpeming.

During the year 1891, a severe outbreak of typhoid fever occurred in the city of Ishpeming, in which there were reported to have occurred 403 cases and 31 deaths. The following is extracted from a letter, of September 26, 1891, from George G. Barnett, M. D., health officer of the city:—

"Our worst cases of typhoid are Finlanders who have been working on the line of the new railroad, northwest of us, known as the Huron Bay railroad. They come here in bad shape, often nearly dead; and the only use they are to us is to swell our percentage of deaths. We are not to blame in any way for their sickness, and would be extremely thankful if they would go elsewhere for treatment. We hear that several have died in camp, along the line of the work, and been buried without ceremony in the woods. How true the reports are, we do not know."

January 18, Dr. Barnett wrote this Office, transmitting a "blue print" copy of "a typhoid fever map of Ishpeming," and also enclosing a copy of the January 16, 1892, number of "Iron Ore," a weekly newspaper published at Ishpeming, from which the following item (which was found marked), concerning the typhoid fever map, is quoted:

"Mr. C. L. Harrison, superintendent of sewer construction, has prepared a very interesting and instructive map in relation to the number of typhoid fever cases in Ishpeming the past summer. The object in view was to ascertain the location of the cases on high and low ground, and to thus determine whether or not the disease was due in any way to drainage. The sewer system not yet being in operation the only parts of the city having any drainage at all of consequence are naturally those of greater elevation. When such drainage reaches the low ground it stays there, having no means of escape, and the prevalence of a large number of cases in those localities led to the preparation of the map to furnish accurate information. On the whole area of the map there are indicated 297 cases. [The total numbers for the whole city for the entire year were 403 cases and 31 deaths.] Of these more than three-fourths, or about 250, as nearly as could be ascertained, were found within the territory bounded by Fourth, Superior, First and North streets, nearly all of which is low ground. A large majority of such cases was located in the territory described, south of the railroad tracks, all of which is low ground. The remaining one-fourth was found on high places, and of such, those immediately and closely surrounded by low ground contain by far the larger number. The map plainly shows that the great majority of cases were in low ground, from which the natural and reasonable conclusion is that the nature of the ground was largely responsible. In those localities where both water and drainage are good few cases appeared, and their presence may be easily accounted for.

"In this connection it is interesting to know that of the 297 cases indicated, 26 came from outside points, and of this number 9 were fatal. Of the 271 home cases but 15 were fatal, showing that, as it was, the disease was not malignant.

"If the inferences from the evidence of the map are correct, it is evident that the lack of proper drainage has been the prime cause for much of the sickness, not only typhoid fever but other diseases. The water supply can not be questioned.

"With the establishment of the sewer now under construction and enforcement of proper garbage regulations the health of the city should and undoubtedly will greatly improve."

The above statement that the water-supply cannot be questioned, seems to need qualification. For in his final report the health officer, Dr. Barnett, reported relative to the mode of the introduction of the disease into his jurisdiction, that the disease "developed here from impure water from a lake;" and relative to the source of the cases after the first, he says: "Perhaps from contact, perhaps from same cause which produced the first cases." Again, he says, that the drinking water of the first

persons taken sick was "from a lake, into which the drainage from large mining location runs." He also states that there were "seven privies on bank of lake. The people deny having used any lake water; but as their only other supply is from a spring, about half a mile away, I think, that when badly rushed, they might have dipped a pail-full out of the lake just back of their house."

The copy of "Iron Ore," sent by Dr. Barnett, contained a marked item concerning the impurity of the ice-supply of Ishpeming, as follows:—

"It is suggested, in view of the fact that the waters of Lake Angeline were long ago decided to be unfit for potable use, that the ice taken therefrom is not good to mix with Lake Sally water for drinking purposes. The sewage from the mines and adjoining mining locations does not tend to make it popular when frozen.

"In the above connection numerous citizens of Ishpeming would like to patronize some enterprising man or firm who will stock a house with ice cut from the surface of a pure lake. This is the time to give the matter attention, as Lake Angeline ice will not be desired if other can be obtained.

"Health officer Dr. Barnett has presented the question to some of the local ice dealers, with the recommendation that they secure ice from a better source if possible. North Lake has been mentioned as such a place, and efforts will be made to cut enough from that place for drinking purposes, using the Lake Angeline ice for ice chests, refrigerators, etc."

Outbreak of Typhoid Fever in Baraga Village.

During the year 1891, a very severe outbreak of typhoid fever occurred in the village of Baraga, Baraga county, in which there were reported to have occurred 250 cases and 20 deaths. July 20, A. J. Braden, M. D., health officer of the village, sent an outbreak report to the Secretary of this Board in which he stated: "The number of cases which have already occurred is 33. The danger of the spreading of the disease, into the jurisdictions of other boards is great, for the reason that many, on becoming sick with the disease, leave for other places. Precautionary measures have been taken as follows: disinfection of discharges of all persons sick." With this report Dr. Braden enclosed the following letter:—

"I herewith send you a report of typhoid fever at Baraga, Michigan. The number given, 33, are only those coming under my own observation, and are, I think, about one-half of the total cases. Four deaths have occurred so far. All of the cases reported were not taken sick in Baraga, eleven (11) of the 33, coming from some [Huron Bay & Iron Range] railroad-construction camps, about 30 miles distant. I understand that there are no physicians in these camps, and when the men are taken sick have to go elsewhere for medical treatment, and large numbers of them have gone to the various cities and villages of the Upper Peninsula, and will probably spread the disease in many new localities. When the sanitary convention meets at Negaunee, I would be pleased to have the representative of the State Board of Health visit Baraga. It is only 50 miles from Negaunee. Some of our citizens are becoming thoroughly aroused, as to the necessity of a radical change in the conditions that have existed here for years; and I think a visit from some members of the State Board of Health would be a great help to them, in their efforts to bring about the much-needed change."

In reply to the above the following letter, by the Secretary of this Board, was sent July 23:—

"Accept thanks for your letter of July 20, relative to typhoid fever at Baraga and at the railroad-construction camps. If possible I hope you will send some of our pamphlets to the foremen (or other influential persons) at the camps. For that purpose I enclose stamps herewith, and two envelopes containing pamphlets, in the larger package addressed to you today.

"I note your request for a committee of this Board to visit Baraga at the time of the Negaunee sanitary convention, which will be August 13 and 14. I presume it will be most convenient to visit Baraga directly after the convention, but of this I am not certain. I will put the subject before the members of this Board, and shall be glad to hear from you again upon the subject. I hope you will be present at the Negaunee convention. Will not your board pay your expenses down there? I hope so."

A committee of two members was appointed by the Board to go to Baraga, at the close of the Negaunee sanitary convention, to investigate the cause of the epidemic of typhoid fever there. The following is a copy of the preliminary report and recommendations of the committee,—which were approved by the Board:—

"The undersigned, a committee from the State Board of Health, at the request of the Health Officer of Baraga, visited that village for the purpose of investigating the cause of the prevailing epidemic of typhoid fever, and are fully convinced that the principal cause exists in the water supply, and would recommend:—

"1. The extension of the water main to beyond Sand Point, and into deep water far enough to avoid the shore current.

"2. That all existing privy vaults be filled up, and that cement vaults be made, and the dry-earth system be adopted, and that, as soon as possible, the entire village be thoroughly underdrained; and

"3. Until such time as these improvements can be made, that all drinking water be boiled.

(Signed) JNO. AVERY,
(Signed) MASON W. GRAY,
Committee.

"The foregoing recommendations are approved by the State Board of Health.

"Negaunee, Mich., Aug. 14, 1891.

(Signed) JNO. AVERY,
President.
(Signed) HENRY B. BAKER,
Secretary."

Epidemic of Typhoid Fever in Iron Mountain.

The following is a brief history of an outbreak of typhoid fever at Iron Mountain, which seems to have begun in August, 1887, and in which, during the year 1891, there were reported to have occurred 210 cases and 15 deaths. Of its origin in 1887 Dr. J. A. Crowell (a physician to the Chapin Mine) said: "The fever was brought to the village by a man from a railroad-construction camp. This man died a few days after his arrival." It is probable that the dejections of this patient were not disinfected as they should have been, and that the germs of the disease found their way into the water-supply of Iron Mountain. Dr. G. B. Johnson, also a physician to the Chapin Mine, wrote: "The outbreak of typhoid fever appeared early in August [1887] following a severe epidemic of dysentery;" and also that, up to December 21, he knew of 350 cases, about 10 per cent of which had terminated fatally.

Samples of drinking water used by families where typhoid fever had appeared in Iron Mountain were examined at the State Laboratory of Hygiene, and the following statement appears on page 8 of the First Quarterly Report of the Laboratory, published by this Board: "That the Iron Mountain water contained the typhoid bacillus, was demonstrated by the potato culture, and by microscopical examination, as well as physiological experiment. The first cultures were made, as has been stated, November 9 [1887], about two weeks after the water had been received. These cultures contained, besides the typhoid bacillus, germs ordinarily found in water; but the second cultures, made December 7, contained only the typhoid bacillus. These had either destroyed or outlived the non-pathogenic orgamisms."

It appears, that at Iron Mountain there were no sewers or other means of removing filth; that privy-vaults were used, and garbage thrown into back yards and streets; that there was a ditch running through the village to a

small lake, from which the ice-supply was taken, and the ditch has been used for a natural sewer.

Iron Mountain was incorporated as a city in 1888, and July 2 of that year, Dr. J. M. Mead, city health officer, wrote: "The sanitary condition of this city has been somewhat improved, so far as removing rubbish and offal from yards and streets is concerned. We have no sewers and consequently no water works."

In 1888 no typhoid fever was reported until September; and December 22, 26 cases and 4 deaths had occurred. In 1889, the first cases of typhoid fever reported to the office of the State Board of Health, were 2, August 3, when A. E. Anderson, M. D., city health officer, stated that "precautionary measures" had been taken to prevent the spread of the disease; but August 26 Dr. Anderson wrote that 3 other cases, presenting typhoid symptoms, had come to his notice, and on September 28, 21 cases of typhoid fever existed.

The following extract from a letter of September 16, 1889, from the health officer of the city, bears upon the sanitary condition of the city at that time. "In answer to your question about the drinking-water where cases of typhoid fever occurred, I will state that the entire city of Iron Mountain is supplied from shallow wells sunk here and there regardless of sources of contamination." The following extract from the Iron Mountain Journal of September 14, 1889, bears upon the presence of typhoid fever and unsanitary conditions: "Sixteen cases of typhoid fever, with two or more fatalities, in the neighborhood immediately adjoining the disgraceful sink-hole and pestilence-breeding swamp, east of Stephenson avenue, between Hughitt and A streets, ought to convince the owners that an ounce of prevention is worth a good many pounds of cure. The city council should take the initial steps in removing this eyesore by filling up the public alley way through the malarial tract, and then firmly insist on private property owners doing their share."

A photograph of this locality, sent to this office by Dr. Anderson, shows a very bad place.

In 1890 it is evident that not all cases of the disease were reported, as, on a blank (L) dated August 12, 1890, it is stated that the first person taken sick with this disease was on the second day of August, while in a final report on typhoid fever, dated January 14, 1891, the first case was reported to have been taken sick October 25, 1890. Both of the above mentioned reports were signed S. J. Gareau, health officer. The whole number of cases reported as having occurred during the year 1890 was 12, and the whole number of deaths 1, and the source of contagium was stated to be "Especially impure drinking water; also bad location of houses."

August 7, 1891, E. Meyer, M. D., health officer of the city of Iron Mountain, reported 5 cases of typhoid fever present; and from the "Iron Mountain Range," of September 10, 1891, the following extracts are taken: "W. B. Rowe, night watchman at the Ludington mine, died at the St. George hospital of typhoid fever." "Miss Lydia Trewartha of Ishpeming, a young lady of about 16 years, who has been visiting with Mrs. John Blackney the past two months, died yesterday of typhoid fever after a brief illness." "Local physicians report that cases of typhoid fever are developing to an alarming extent. The cause is attributable to the fact that we have no sewers, and to the use of impure water."

October 6, 1891, F. J. Trudell, Mayor of Iron Mountain, sent the following letter to the Secretary of this Board:—

"*Iron Mountain, Mich., October 6, 1891.*

"HENRY B. BAKER, M. D.,

"*Secretary State Board of Health, Lansing, Mich.:*

"DEAR SIR:—We have been having a rate of death in this city from typhoid fever, that is simply awful. This sickness has become so serious that the city council recognized the fact that something had to be done, to get the State Board of Health to come here immediately. And on last Monday night they appropriated the sum of $250 to defray the expenses of your Board. As the cold weather sets in so early here it would be advisable for the Board to come immediately. Rev. A. E. Cook, who has written to you in regard to this matter, will forward you the necessary petition, and as the city council will defray your expenses, I know and hope you will do every thing in your power to help us in this matter.

"Please come immediately and assist to save the lives of the balance of the citizens.

"Yours truly,

"F. J. TRUDELL, *Mayor.*"

Also the following petition, signed by over 50 of the leading citizens of Iron Mountain, was received:—

"*Iron Mountain, Mich., October 2, 1891.*

"*To the Honorable the State Board of Health, Lansing, Mich.:*

"GENTLEMEN:—The undersigned citizens of Iron Mountain, Mich., believing that the public discussion of questions relating to the public health, under the auspices of the State Board of Health, would result in great benefit to our city, hereby respectfully petition that a sanitary convention may be held in Iron Mountain, under the direction and with the coöperation of your Board or a committee thereof, at such date prior to Nov. 14 as you may be pleased to select."

On October 10, F. A. Todd, President of the Iron Mountain Water Works Company, wrote this office, enclosing the following newspaper clipping:—

"The city council last Monday evening appropriated $250 to pay the expenses of the State Board of Health in holding a sanitary convention in this city. The main object of this action is to get reliable testimony in reference to the water supply selected by the water works company, and the surrounding conditions, and the importance of this question amply warrants the expenditure. We shall expect from them unprejudiced testimony, which if favorable to the water works company ought to go a long way toward establishing public confidence in the service they propose to give. If the contrary is the case it is unnecessary to add that nothing short of boodle and lots of it will ever secure a franchise for the company, if, indeed, a liberal use of the root of all evil should prove effective."

The following is Mr. Todd's letter, with which the above newspaper clipping was enclosed:—

"*To whom it may concern:*—

"The recent action of the Common Council of the city of Iron Mountain, Michigan, in voting $250 to defray the expense of the State Board of Health for the ostensible purpose of making an examination of the proposed water supply of said city (as developed by our company on the north shore of Lake Antoine), in view of the hostile action of a portion of the Council heretofore exhibited toward us, leads us to think that its recent action is not taken except in the same hostile spirit in which we have been heretofore met. For this reason we deem it fair that our side of the controversy be made known to you.

"The city of Iron Mountain by its Common Council late in the summer of 1890, gave to Messrs. Coats & Phillips, from whom we derive our title, a franchise to put in water works, and by the terms of the franchise agreeing to pay $9,000 per year for hydrant rental for fire protection. Messrs. Coats & Phillips assigned such franchise to Messrs. Todd & Batchelder, and they in turn assigned to us. The works were put in, all being first-class, costing $160,000. It getting late in the fall (1890) when the works were completed, the city was temporarily furnished with water from the edge of Lake Antoine and the well.

"This water was used for all purposes up to the early summer of the present year, when the water becoming unpleasant to the smell on account of fish getting into the pipes, cleaning out, etc., the use for drinking purposes was generally discontinued. The use for fire purposes continued up to about the month of August.

"On learning that the water was found disagreeable for drinking purposes we at once set about to find a source of supply which should be satisfactory to the people, and to that end caused the water from

near the middle of Lake Antoine to be analyzed by some of the most scientific chemists in the State, and the water being pronounced safe and wholesome, at once bought the pipe to lay out into the lake to the point from which the test water had been taken. After the pipe had been delivered in Iron Mountain it was condemned by some of the Council as unfit to be laid and the statement made to us that the water from the lake would not be acceptable to the Council whether the analysis showed it to be good or not. Not wishing to give the city a water which did not suit them, the laying of the pipe was deferred and other sources of supply sought out. While this search was going on it was discovered (on our part for the first time), that the City Council had not, before the granting of the franchise, passed a certain preliminary resolution, without which we could not condemn property for the purpose of obtaining the water supply source, and the right of way for our pipes therefrom into the city. We then asked the council to pass such resolution that we might be enabled to condemn when necessary, but were met by a refusal. We had been looking at a water supply at Moon Lake, and the owner of the lot upon which the Moon Lake springs were found, and the owner of the land between that and the city put the price to us at $25,000 as the least it would cost to own such source and the right of way (less than ¼ of a mile) to the city. The refusal of the Council to pass the necessary resolution at the time, while it made no difference to us in that instance, as our engineer determined, and reported to us, that the supply would be inadequate, yet showed that they were hostile to us and willing to put impediments in the way of our getting water to the city.

"At about this time Mr. Jones, one of the leading citizens of the place informed us of a water-supply (the one now proposed to be examined by the State Board of Health), and as subsequently developed has proved, as we claim, capable of furnishing a very superior quality of water for all purposes. Upon testing this new source of supply and finding it excellent, we again asked the Council to pass the resolution that we might condemn this source and not wait to obtain it by negotiation and purchase, but the Council refused, and a long wait was the consequence, though we did all in our power to obtain the property as quickly as possible.

"When the property was finally obtained, in order that we might get the water into the city at the earliest moment from this proposed point of supply and the better to satisfy the Council, we proposed to them to lay the pipe around the lake; but the Council again refusing to pass the resolution so that we might condemn the right of way around the lake and the property being in the hands of a great many persons, we proceeded and are now proceeding to lay pipe through the lake.

"Thus it will be seen that the Council has thwarted us in our best endeavors to get a supply of water, and, as we believe, in the hope that our enforced delays might aid them in obtaining a decree of Court, restraining our operation of the works and forfeiting our franchise.

"The physicians of Iron Mountain, so far as we are acquainted, at least,—Drs. Crowell, Edgecomb, Hutchinson and some others, ordered the use of hydrant water in sections of the city affected with typhoid fever up to late in September, and, as we believe, still view the present supply of water as safe.

"We are in full possession of the reasons why a portion of the Council are, and have been, against us, but as that does not affect the merits of the controversy nothing need be said upon that subject.

"The foregoing will enable the Board to give the proper weight to any statements made by our enemies in reference to this matter. All we ask is a fair and unbiased investigation.

"Respectfully submitted,

"THE IRON MOUNTAIN WATER WORKS CO.,

"Dated, October 10, 1891." "F. A. TODD, *President.*

In response to the petitions, a sanitary convention was arranged for and was held at Iron Mountain, October 30 and 31, 1891, at which papers were read, and discussed, concerning such subjects as the restriction and prevention of typhoid fever, the water-supply of Iron Mountain, sewerage and drainage, disposal of waste and excreta, etc. In response to a request of the Mayor and Common Council of the city, that the State Board present them with brief recommendations, concerning the sanitation of their city, the Board prepared and offered the following recommendations:—

"*To the Honorable Mayor and Council of the city of Iron Mountain:*

"GENTLEMEN:—In accordance with your request that we, members of the Michigan State Board of Health, place before you, in brief form, any recommendations which we may desire to make concerning the sanitation of your city, the following is respectfully submitted:

"In the first place, it may be well to formulate some of the facts concerning the sanitary condition of your city, as it has existed for the past few years, and as we found it at the time of our inspection:

"In 1887 you suffered from a severe epidemic of typhoid fever. At that time the sickness was attributed to the polluted well water which many of your inhabitants drank. Analyses made by chemists of your city, and those made at the State laboratory of hygiene alike condemned this water. In our report of four years ago there occurs the following paragraph:

"'There can be no question about the need of a supply of pure water. This should, by all means, be obtained; and some provision should be made for disposing of excrement, slops and garbage. It matters not how cold it may be this winter, the low temperature will not destroy the typhoid germ unless there be successions of freezing and thawing; and with the soil filled with these germs some of them will be likely to find their way into the air breathed, food eaten, or water drank, and produce the disease. It should also be remembered that typhoid fever may be caused by the use of impure ice.'

"We see no reason now for changing the opinion expressed at that time, both by those of your city who examined into the matter and ourselves, that the water taken from the surface wells so largely employed by your people formed the chief source of the disease. While some sanitary advance has been made since that time, as is shown by the partial filling of a stagnant pool near the center of your city, the general sanitary conditions remain the same as they were four years ago, and, consequently, the same disease prevails. Many of your people continue to deposit excrement and other waste in privy vaults and cesspools and to take their drinking water from the same stratum, or a lower stratum, of earth. We see no probability of the permanent disappearance of typhoid fever so long as the above-mentioned method of disposing of waste, and the source of drinking water continue the same.

"We are glad to see that you are introducing a system of sewerage; and we wish to express the hope that you will rapidly extend the lines until every house is connected with the sewers. You should also give more attention to the disposal of garbage. This should not be allowed to accumulate and decay in alleys and back-yards. While typhoid fever is largely disseminated by polluted water, there can be no doubt, in our opinion, that it may be spread by contamination of the air and soil.

"As to your water-supply, we have the following statement to make: First, in regard to the desirability of obtaining your water from near Quinnesec falls, we would ask you to remember that the outflow of these springs lies many feet below the outflow of your sewerage as you propose to dispose of it, and while the water from the springs at the falls may be and probably is, at the present time, altogether unobjectionable, the danger in its possible pollution in the future should not be disregarded.

"In reference to the water which the Iron Mountain Water Co. has been furnishing, and also concerning that which it purposes to furnish, we think that the following statements may be made:—

"(1.) The location of the well in the low, marshy ground between the city and Lake Antoine was unwise. Indeed it has been shown to be unwise for two reasons, viz.: The supply has been inadequate, and the quality has been unsatisfactory. We believe that the water company management will not deny these statements.

"(2.) Taking the supply from the lower extremity of Lake Antoine, where the water is only a few feet deep and the bottom of the lake filled with mud and decomposing vegetable matter, has also, as might have been expected, proved unsatisfactory. In regard to this water, there seems to be no reason for changing the verdict of our chemist as given some months ago. The water is chemically bad, but contains no pathogenic germs. The testimony of your physicians and others, during our visit, was that this water was repulsive to the taste and smell, but that there was no proof that it had caused any disease; in fact nearly all claimed that those who had used this water had escaped the fever. However, we do not hesitate to say that this is not a suitable water.

"(3.) Whether the water which will flow into the galleries now being constructed will prove ample in amount, and wholesome in quality, we have no means of positively determining at present. Provided that it is shown that this water comes from the hills to the north, and that it is abundant, we can see no *a priori* reason for condemning it. Thorough chemical and bacteriological analyses of it should be made from time to time, and, by this means, we believe that the question of its potability can be determined.

"There can be no objection to laying the pipe through the lake provided that it is properly done. Whether the pipe which is now being laid is the most trustworthy or not we do not feel that we are sufficiently versed in engineering matters to decide. Whatever the nature of the pipe, it could be frequently tested, and the presence of leaks could be easily recognized.

"We desire to express our high appreciation of the interest exhibited by your honorable body in the sanitary welfare of the people under your care, and to join with you in the hope that Iron Mountain may soon be free from preventable disease."

E. Meyer, M. D., health officer of Iron Mountain, reported November 15, as follows: "Typhoid fever has decreased wonderfully, so much so that today we have not more than 3 or 4 cases, and these are relapses. Have all the reports on record,—total 209 cases of typhoid fever." Only one more case was reported during the year 1891, making in all 210 cases and 15 deaths.

Outbreak of Typhoid Fever at Negaunee.

There was an outbreak of typhoid fever in the city of Negaunee, during the year 1891, in which there were reported to have occurred 58 cases and 7 deaths. On June 3, 1891, an outbreak report, dated June 1, was received from C. F. Cochran, M. D., health officer of the city of Negaunee, reporting one case of typhoid fever, in his jurisdiction, taken sick "the first week in May, 1891." August 11, a final report was received stating that 4 cases and 1 death had occurred. Among the difficulties in the way of enforcing isolation and disinfection the health officer mentions "Ignorance and lack of care on the part of the people."

September 4, the following letter, dated September 2, was received from the health officer:—

"I write you for information in my line, and will state the case. Dr. Gourdeau, of Ishpeming, has three cases of typhoid in our city among his nationality (French). Until I spoke to him he did not report them to me. When I told him I wanted him to report such cases so I could put up signs, he said there was no law that required a sign on house for typhoid fever; he did not believe it was a communicable disease, etc., and they had 300 cases at Ishpeming and never put up sign, etc.,—which is a fact, as I am told, and never did here till I did. Well to the point. I put up the sign on his cases here, and that day he tore them down. I spoke to the prosecuting attorney, and he said, he could be prosecuted, but the law is so vague and loosely made that he doubted if there could be a conviction. Now I had just such a case at West Branch, and the prosecuting attorney said the same thing. In a mixed community of so much superstition and ignorance, as there is where there are so many foreigners, and where one man, who is supposed to be up to the late ideas, takes the lead in resisting the signs being put on houses, what shall a health officer do? Please notify me what to do and indicate where the law is explicit enough to convict in such cases. If I am the only one in the State that has such trouble, I would like to know it, as I have never seen a case reported of a health officer prosecuting any one for like offense in Michigan. Please show law to me so I can instruct attorney, if you deem it best.

"Please send a lot of typhoid fever pamphlets in English, French, Swede and Finland. There are no Hollanders up here—don't send any more of them [pamphlets in the Holland language]. Typhoid fever is getting pretty thick here,—in two weeks about 25 cases. They are using well water and Teal Lake water about even. An early reply will be thankfully received."

The following reply was sent from this Office, September 4:—

"C. F. COCHRAN, M. D.,

"*Health Officer of the City, Iron Mountain, Michigan:*

"DEAR DOCTOR:—In response to your letter of September 2,—I send you a lot of pamphlets, on typhoid fever, in the English language. We have none in any other language. Yesterday I sent leaflets in Swedish, etc., in which typhoid is briefly treated. I wish you would see Mr. Elfbrandt and learn whether or not he is going to make the translation of that leaflet into the Finnish language. * * *

"You ask about the health officer prosecuting a person,—I know of no law requiring or authorizing this. The law requires the health officer of every city to notify the prosecuting attorney. It is the duty of the prosecuting attorney to prosecute. You have the Public Health Laws, and I send you marked references to it herewith, namely, to §1684 and §8442, Howell's Statutes, being sections 47 and 577 of 'Public Health Laws' 'in Force in 1890.' These are the two sections which you might show your prosecuting attorney.

"I send you herewith a copy of a leaflet on typhoid and typho-malarial fever, and I would ask your

attention especially to the recommendation of this Board that your board *make* and *publish regulations* relative to typhoid fever, and after having made and published them, that you enforce them. You might show this leaflet to your prosecuting attorney. But if he still thinks that the law cannot be enforced, I think there will be no doubt about enforcing it, after your board should make the regulations.

"You might call Dr. Gourdeau's attention to Act 137, Laws of 1885, which I send to you, and have marked to call attention to the fact, that whoever violates the orders of the health officer, relative to communicable diseases dangerous to the public health, is liable to a fine and to imprisonment if the fine is not paid. I have sent to Dr. Gourdeau three of our leaflets bearing on these subjects, and have marked the law. "Very respectfully,

"HENRY B. BAKER,
"*Secretary.*"

The following request signed by over 60 of the leading citizens of Negaunee, was received by the Secretary of the State Board of Health:—

"We, the undersigned citizens of Negaunee, Marquette county, Michigan, in view of the fact that we now have an epidemic of scarlet fever and typhoid fever in our midst, and remembering the terrible scourge we received in the past few years, would respectfully request the State Board of Health to hold a convention at their earliest possible convenience in this city, and we will heartily coöperate in making the convention a success."

In response to this petition a sanitary convention was arranged for, and held at Negaunee, August 13 and 14, 1891, during which papers bearing directly and indirectly on the causation, and the restriction and prevention of typhoid fever, were read and discussed. During the convention, after making investigation, the State Board of Health offered the following recommendations:

"In the judgment of the State Board of Health, it seems desirable that a source of water supply less liable to contamination than Teal Lake, should be found; but, if it should prove impracticable to obtain water from a better source, and water must still be taken from the lake, we would respectfully recommend:

"1. That all slaughter houses and similar establishments be removed to a point where the drainage will be away from the lake.

"2. That the lake be no longer used for the storage of saw logs, or for the deposit of refuse from mills.

"3. That an intercepting sewer be constructed along the south and east shores of the lake, and all residences on that water-shed be connected therewith.

"4. That, if found practicable, all water from the mines shall be disposed of through this intercepting sewer; if this is not practicable, that it be disposed of by other means than by being pumped into the lake.

"5. That no rubbish, refuse, or filth of any kind be allowed to be deposited anywhere upon the shores of the lake."

Prompt action seems to have been taken by the common council of Negaunee in the direction of these recommendations, as may be seen by the following items from the proceedings of the council meeting of September 3, quoted from the Negaunee "Iron Herald" (Supplement) of September 18, 1891:—

"The petition of A. Maitland and 288 others, asking that steps be taken towards improving the purity of the waters of Teal Lake, etc., was read and referred to the council as a committee of the whole with power to take immediate steps.

"A copy of a notice served on Johnson Lumber Company forbidding the logs, etc., in Teal Lake, was read, received and ordered placed on file.

"Moved by Alderman Pellow, seconded by Alderman Ramquist, and carried, that a special committee of two aldermen and the mayor be appointed for the purpose of investigating the old plans to establish a system of sewerage and also for the purpose of examining the outlet for the same and to report as soon as possible as to what can be done in the way of laying the trunk sewer this fall.

"Alderman Jackson offered the following resolution which was adopted:

"*Resolved*, That Winter & Suess be required to remove their slaughter and rendering house east of Teal Lake from its present position to some place where the drainage from the same cannot reach Teal Lake, or to discontinue the use of said slaughter or rendering house, the same to be discontinued or removed within ten days from the time of service on them of a copy of this resolution."

Typhoid Fever in Deerfield Township and Village, and in the Township of Blissfield, Lenawee County, Michigan.

The Detroit Free Press of August 20, 1891, contained the following:—

"Some parties while threshing near Blissfield a few days ago, pumped dry the well. Since then nearly all of the help have had typhoid fever, and one man has died. Investigation showed a dead black snake at the bottom of the well."

Inferring from the above that the outbreak was in Blissfield township, a letter was sent from this Office, August 20, to Dr. R. M. Eccles, the health officer of the township, urging that active measures be taken to restrict the spread of the disease, and requesting reports to be made to this Office.

August 22, Dr. Eccles wrote,—"as the cases of typhoid fever are all located in Deerfield township, I forwarded the letter and circulars to Dr. Yale, health officer of Deerfield township."

Upon the receipt of Dr. Eccles letter of August 22, a letter similar to the one sent to him, Aug. 20, was sent to Dr. Yale.

August 23, Dr. Webster Bliss, health officer of Deerfield village, sent the following letter to this office:—

"About the sixth of August, we had an outbreak of disease which has since proved to be typhoid fever, all cases of which are traceable to one and the same source of infection. There has been in all sixteen (16) sick, all of them coming down with typhoid symptoms. Eight of them had and are having a run of the fever, the remainder seemingly aborted. One died, one expected to die at any time. Two of the cases are in the village, and are under my care, the rest are in the country, and are attended by several different doctors. The source and place of outbreak is at a wealthy farmer's. (Six of his family are or have been sick, one died). Cause supposed to be bad water."

September 2, Dr. Bliss sent to this Office a diagram of the premises where the supposed infected well is located. The following extract is from his explanatory letter:—

"The well has been used for house use for twelve years, and has caused no sickness. The tile was put in last fall, and the well was thought to be in better condition than ever before. There has been no special sickness in the family for years. The privy is very carefully cared for. Excrement received in a box and frequently removed."

The following is from the letter sent from this Office, September 2, to Dr. Bliss.

"The distance from the hog-pen to the well is not given, but it seems to me not to be over forty feet, and that the well is not in a safe place. You do not state the depth of the well. I do not understand what relation the 'tile-well' bears to the suspected well. Is it possible for the surface water to enter the 'tile-well' and reach the stratum from which the suspected well draws its supply of water, through this 'tile-well?'

"I would be pleased to learn the distance from the well to the hog-pen, to the privy, and to the dwelling house."

The following is taken from Dr. Bliss' reply, Sept. 6:—

"The hog-pen is forty feet from well—the well is 12 feet deep. Three feet from bottom is two or three feet of quicksand. The tile-well is an opening into a tile-drain which takes off surface water, and runs along behind corn barn and hog-pen. The house is about 12 rods from barn well (the suspected well). The privy is 20 rods from well.

"The barn yard is surrounded on three sides by buildings with one-half of roof on yard side. After a protracted dry spell, a heavy rain would (might) saturate soil in yard enough to reach to stratum that supplies well. We have now *lost five cases with one seriously sick.*"

The following appeared in the "Times and Expositor" (a newspaper printed at Adrian) of Sept. 7:—

"Five people have died from the poisonous effects of water from a well on the Gilson farm, near Deerfield.

"Something over two weeks since a threshing crew was at work on the Gilson place. The engine drew its supply of water from the well on the premises, taking therefrom a number of barrels daily. The well is not a very abundant one, and as a result of the extraordinary demand upon it the water became very low. It was observed to be rather muddy and repulsive to the taste, but it was the only water in the place, and everybody drank of it as usual. The well had been in existence for years and no inconvenience had resulted before from the use of its water.

"Within 36 hours after drinking of large quantities of the water from the well at its low stage, every member of the family and threshing crew were attacked with violent nausea. The nausea was followed by fever, which increased in violence and rapidly developed the most malignant typhoid type. All the medical talent in the vicinity was called in, but nothing seemingly could stay the progress of the disease.

"Three children of the Gilson family died last week of typhoid fever before it dawned upon the attendant physicians that the well water was at the bottom of the trouble. A specimen of it was subjected to microscopic test, and the presence of fever germs in astonishing quantities was established. The doctors were convinced at once that the disease which carried off the children was communicated from the water. The first supposition [was] that the nausea had been caused by something in the food, and that the fever had developed from constitutional weakness.

"*Tom Johnson of Petersburg*, one of the threshing crew, died of typhoid fever Thursday, and his ailment is also directly traceable to the water of the well. Investigation shows that all who partook of the poisonous water were, as stated, attacked with nausea followed by fever. A farm hand named Monroe, residing near the Gilson farm, died early in the week, and thus far the number of victims is five. The fever has only fairly developed in other cases, and what the outcome will be can only be conjectured.

"Some of the patients are very low. In all 25 people were affected, and about half of them seriously."

Up to September 14 nothing had been heard from Dr. N. D. Yale, the health officer of Deerfield township, relative to the outbreak. The following extracts are taken from a letter sent to him on that day.

* * * "Will you have the kindness to make reports to this Office relative to this alleged outbreak of typhoid fever, and any information which you may be able to give relative to the suspected well and its surroundings will be thankfully received. Was there a snake in the well? * * * Is this a case which the State Board should send a man to investigate?"

The following extracts are taken from Dr. Yale's reply of Sept. 15:—

"Threshers did pump a well dry at C. Gilson's. Three of the threshing crew of four were sick afterwards. The fourth man who was not sick did not drink water, but did drink milk. Of the neighbors who assisted in the threshing, nearly all were sick after. Five have died including Gilson's oldest son, and there is under my care one other who will probably die. There is a street west, in township of Blissfield, one-half mile long, in which there are eight cases. Five of these I think probably are derived from one of the threshing cases. * * * There was nothing found in the well and nothing has been looked for.

"The well which I believe to have been the cause of the sickness is within 4 feet of an extensive barnyard and within 30 feet of a large framed hog-pen in which hogs are constantly kept.

"I have had outbreaks before traced to hog excreta, and the cases were in my judgment similar to these.

"Circumstances are such here you ought to send a State officer to look the matter up. * * * He [Mr. Gilson] thinks the house well the one, *if either*, that caused the trouble. His doctor took water from it,

and from the other well above mentioned, and 'analyzed' them by setting them in a window, and pronounced the barn well *pure*, whilst the house well did contain a little sediment, so he said.

"However, I had a fever case in a man who did not eat at Gilson's and did not drink there except from the *barn well*.

"I wish you would send a health officer here, and there is another reason why he should come tomorrow, if possible."

The following extracts are taken from Dr. Yale's letter of Sept. 19:—

"My letter of 15th was in reply to yours of 14th, in yours you say 'Is this a case which the State Board should send a man to investigate?'

"I said yes, and owing to another matter in which I am not directly interested I suggested he come at once. Yours of the 18th explaining that you have no means of doing so, of course ends our expectations.

* * * Regarding the five cases mentioned of typhoid fever probably derived from threshing cases. One of the threshing cases was young Ackly. He went home, had the fever and recovered. Soon after four of his brothers and sisters came down in his father's house, where he was sick. One, a girl of 16, has died. Three are now sick, and a neighboring aunt who gets her water at their well, is also sick. Their well is a deep bored well (104 feet) with reservoir which is said to have been cleaned. I cannot think their water is the cause of the trouble, for reason given above. The aunt, I am attending. Her case is serious. I also, in same neighborhood, have two other cases, which I cannot attribute to anything except bad water on their own premises.

"There is another severe case in same neighborhood which I have not seen. One of the threshing cases in this village [Deerfield] has had a relapse with severe hemorrhage, and will probably die. This will make seven fatalities."

In this epidemic there were reported to have occurred, in Deerfield village and township, and in the township of Blissfield, 26 cases and 14 deaths.

TRANSGRESSIONS OF PUBLIC-HEALTH LAWS.

In many outbreaks of typhoid fever isolation and disinfection, either one or both, were not enforced, as may be seen by the following:—

Relative to the outbreak in the village of Newaygo, in which there were reported to have occurred 31 cases and 1 death, the health officer, Dr. Tyson Smith, in response to the question as to which of the patients were isolated from all other persons except the nurse and physician, responded: "Do not know; impossible to tell." Again in reply to the question as to what exceptions there were to complete isolation and disinfection, he replied: "Many would not obey my orders. I made one arrest for violating my directions."

An outbreak occurred in the city of Kalamazoo in which there were reported to have occurred 20 cases and 2 deaths. In his final report the health officer, Dr. C. Van Zwaluwenburg, in response to the question, were all bowel discharges, of all the sick, disinfected before being removed from the house, replied, "No." To the question as to whether clothing, bedding, etc., soiled by discharges of the patients were disinfected, he replied, "No." To the question as to what exceptions there were to complete isolation and thorough disinfection, he replied: "Several paid no attention to it."

An outbreak of typhoid fever occurred in the township of Torch Lake, which lasted from August 25 to December 20, 1891, in which there were reported to have occurred 48 cases and 2 deaths. To the question, if any beside the first case were sick with typhoid fever, how did they contract the disease, he replied: "They were housed together largely and contracted it by contagion or infection."

In a letter of September 11, 1891, William E. Ziegenfuss, M. D., health officer of the city of Alpena, reported the following: "We have just entered upon what promises lively times for the doctors. The town is full of so-called *typho-malarial* fever, many cases of which, to my mind, appear to be pure typhoid. These cases are not reported and nothing is known of them until reported in the papers or they die. Some cases of typhoid fever have been reported. The indications point to an outbreak of typhoid fever here this fall."

MEASURES TAKEN TO RESTRICT TYPHOID FEVER.—RESULTS.

The following is the substance of a few statements of health officers, which are somewhat representative of those who reported quite fully that they enforced isolation and disinfection:—

Concerning the measures taken to restrict an outbreak in Columbia township, Jackson county, July 13 to August 23, 1891, and which was limited to one case, the health officer, Emmet Palmer, M. D., reported in substance as follows:

No visitors were allowed to enter the house; all bowel discharges were disinfected before being removed from the house, one-half pint of sulphate of iron solution being used for each discharge which was then buried in dry earth one foot deep; the privy was disinfected with one pound of chloride of zinc; all clothing and bedding soiled by discharges of the patient were thoroughly disinfected in corrosive sublimate solution; on recovery the room which had been occupied by the patient was disinfected by fumes of burning sulphur; there were no exceptions to any of these measures.

Of an outbreak in Palmyra township, Lenawee county, October 23 to November 17, 1891, which was also limited to one case, the health officer, James E. Jacklin, reported in substance the following concerning the measures taken to restrict the disease:

No one but the nurse was allowed to see the patient and every precaution was taken; from the first day of sickness all bowel discharges of the patient were disinfected, one quart of sulphate of copper being used for each discharge, and the discharge was then buried; clothing and bedding soiled by discharges of patient were thoroughly disinfected and everything which came in contact with the patient was destroyed by fire; on recovery the room occupied by the patient was disinfected by 6 pounds of burning sulphur. There were no exceptions to the enforcement of these measures.

An outbreak occurred in the village of Farmington, Oakland county, October (?) to November 12, 1891, which was restricted to the first case. The health officer, Thomas H. Turner, M. D., reported in substance as follows concerning measures taken to restrict the disease:

I distributed the pamphlets you sent me, on the restriction and prevention of typhoid fever; all visitors were excluded from the house, and the attending doctor did everything he could and was ably assisted by the family; each bowel discharge was disinfected by two ounces of chloride of lime and then buried away from dwellings; all cloths and papers used about the patient were burned; on recovery, all bedding and clothes used about the patient were hung out in the room which had been occupied by the patient, and the room was disinfected with 6 pounds of burning sulphur.

TABLE 8.—*Exhibiting, for the Year 1891, the Average Numbers of Cases and Deaths per Outbreak of Typhoid Fever: (1) in all the 541 outbreaks reported; (2) in the 430 outbreaks in which it is doubtful whether or not Disinfection or Isolation was enforced; (3) in the 25 outbreaks in which Disinfection was enforced and Isolation was neglected; (4) in the 56 outbreaks in which both Isolation and Disinfection were neglected; (5) in the 31 outbreaks in which both Isolation and Disinfection were enforced.*

	(1) All outbreaks. (541outbreaks*)		(2) Isolation or Disinfection or both not mentioned, or statements doubtful. (430 outbreaks.)		(3) Disinfection enforced, Isolation neglected. (25 outbreaks.)		(4) Isolation and Disinfection both neglected. (56 outbreaks.)		(5) Isolation and Disinfection both enforced. (31 outbreaks.)	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Totals	4,018	607	2,751	474	58	8	1,196	114	54	9
Averages	7.43	1.12	6.40	1.10	2.32	0.32	21.36	2.04	1.74	0.29

* These do not include the cases and deaths in Detroit and Grand Rapids because of the difficulty in determining the beginning and ending of an outbreak in these cities, in which the disease is present in some part of the city nearly all the time.

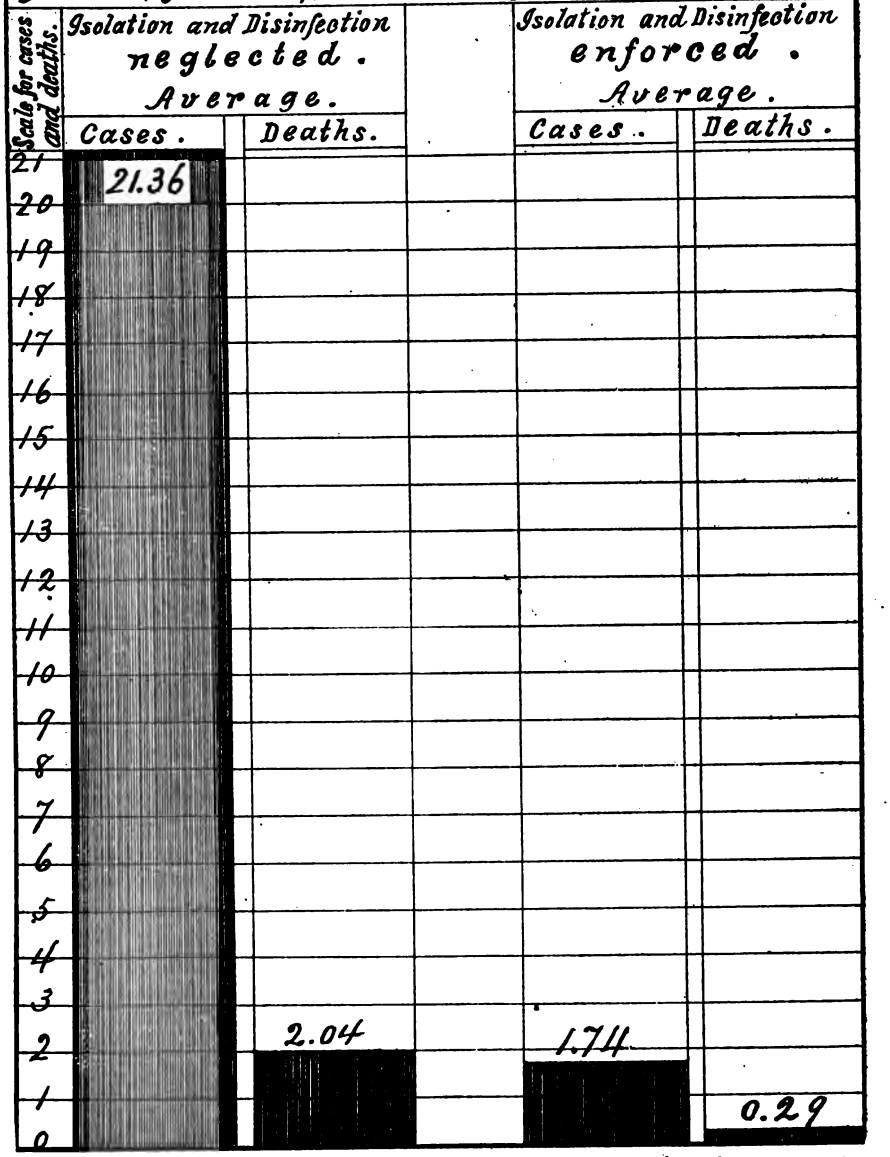
In studying the effects of efforts of health officers for the restriction and prevention of typhoid fever, and of the difficulties experienced by some of them in carrying out the methods recommended by the State Board of Health to that end; it is interesting to note the difference in the reported numbers of cases of sickness and of deaths, from this disease, in outbreaks where local health officers were enabled to enforce isolation and disinfection, and in those outbreaks in which, for any reason, those restrictive measures were neglected.

Table 8 and the diagram on page 257 graphically illustrate this difference, and show that in outbreaks relative to which the reports state that isolation and disinfection were enforced, there occurred 1.74 cases and 0.29 of one deaths per outbreak; whereas in those outbreaks where isolation and disinfection were neglected, there were 21.36 cases of sickness and 2.04 deaths per outbreak; or about twelve times as many cases and seven times as many deaths in outbreaks in which isolation and disinfection were neglected, as there were in outbreaks where those restrictive measures were enforced. It therefore seems probable that if proper restrictive measures had been adopted in all the 541 outbreaks of this disease which were reported to this office during the year, with results similar to those obtained in the above-mentioned outbreaks where isolation and disinfection were enforced (1.74 cases and 0.29 of one death per outbreak), there would have occurred only 941 cases of sickness and 157 deaths from this disease in the State during the year, instead of the 4,018 cases and 607 deaths which actually occurred in those outbreaks which were reported; and a saving to the State of 3,077 cases of sickness and 450 lives would have been effected.

This showing seems to present a forcible argument in favor of the adoption of the preventive measures above referred to, and a strong plea for the coöperation of all the people, in the efforts of health officers to stamp out this preventable disease.

Isolation and Disinfection Restrict Typhoid Fever.

Typhoid Fever in Michigan in 1891:- Exhibiting the Average numbers of cases and deaths per outbreak:- in all outbreaks in which Isolation and Disinfection were both neglected, and in all outbreaks in which both were enforced. * *(Compiled in the office of the Secretary of the State Board of Health, from reports made by local health officers.)*



*Including the disinfection of the bowel discharges of the patients.

AVERAGE DURATION OF TYPHOID FEVER.—FATAL AND NON-FATAL CASES.

TABLE 9.—*Exhibiting by Sex of patient, the Average Duration (in days) of Fatal cases of sickness from Typhoid Fever, in Michigan, during the five years, and during each of the five gears, 1887-91. (Compiled from those reports which stated the length of time the patient was sick.)*

Fatal cases of Typhoid Fever.														
Year.	Sex.	No. of cases included.	Duration of Sickness:—Per cent of Deaths in each Period of Days.											
			All cases.	Under 10 days.	10 to 15.	15 to 20.	20 to 25.	25 to 30.	30 to 35.	35 to 40.	40 to 45.	45 to 50.	50 to 55.	55 Days and over.
1887.	Males	81	100	10	7	15	21	16	11	12	2	4	1	0
	Females	32	100	31	19	19	16	6	3	0	0	6	0	0
1888.	Males	40	100	20	13	18	23	10	8	0	5	3	3	0
	Females	33	100	24	21	15	12	9	6	3	0	0	9	0
1889.	Males	42	100	17	14	19	7	14	5	7	2	7	0	7
	Females	51	100	18	24	14	16	10	2	6	2	2	0	8
1890.	Males	57	100	19	9	21	23	5	5	7	0	4	2	5
	Females	26	100	19	23	8	8	19	12	0	8	0	0	4
1891.	Males	80	100	14	20	18	23	10	6	5	1	1	0	3
	Females	56	100	20	23	20	11	9	2	5	5	0	0	5
Av. 1887-91.	Males	60	100	16	13	18	19	11	7	6	2	4	1	3
	Females	40	100	22	22	15	13	11	5	3	3	2	2	3

From Table 9 it may be seen that of the 300 males who were reported to have died from typhoid fever within the five years 1887-91, and of which the interval between the day of being taken sick and day of death was given, the largest per cent died in the two periods from the 15th to the 20th and from the 20th to the 25th day of sickness, and that 53 per cent were sick twenty or more days before they died; while of the 198 females reported as having died in the same time, 22 per cent died before the tenth day, and that only 44 per cent were sick longer than nineteen days.

The average duration for the fatal cases, was in males 20.2 days, and in females 20.2 days.

In Table 10 it may be noticed that the duration of sickness in *non-fatal* cases of typhoid fever for the five years, 1887-91, was about the same for both sexes; 59 per cent of the males and 61 per cent of the females recovered before the thirty-fifth day of sickness. The average duration was:—males 33 days, females 32 days.

The average duration of all cases, fatal and non-fatal, was:—males 26.6 days, females 26.1 days; and for all cases of both sexes, 26.37 days.

TABLE 10.—*Exhibiting by Sex of patient, by per cent of cases which recovered in specified periods of time, the Average Duration (in days) of Non-Fatal cases of sickness from Typhoid Fever, in Michigan, during the five years and during each of the five years 1887-91. (Compiled from those reports which stated the length of time the patient was sick.)*

Non-Fatal Cases of Typhoid Fever.														
Year.	Sex.	No. of cases included.	Duration of Sickness:—Per Cent of Cases in each Period of Days.											
			All Periods.	Under 10 Days.	10 to 15	15 to 20	20 to 25	25 to 30	30 to 35	35 to 40	40 to 45	45 to 50	50 to 55	55 Days and over.
1887.	Males	208	100	0	5	6	12	16	18	15	9	6	3	8
	Females	158	100	0	9	9	19	12	17	11	6	4	3	9
1888.	Males	164	100	1	4	13	9	13	15	9	10	9	9	7
	Females	111	100	0	2	7	14	15	15	19	4	8	10	8
1889.	Males	166	100	2	7	13	14	16	14	12	9	6	2	5
	Females	165	100	6	8	9	14	19	12	11	8	4	2	7
1890.	Males	226	100	1	4	7	15	18	19	12	10	5	2	8
	Females	110	100		4	14	16	17	13	14	9	2	5	6
1891.	Males	463	100	3	5	7	16	19	9	11	11	6	3	11
	Females	276	100	2	4	9	14	15	10	14	10	4	5	12
Av. 1887-91.	Males	244	100	1	5	9	13	16	15	12	10	6	4	8
	Females	164	100	2	5	10	15	16	13	14	7	4	5	8

In studying table 11 relative to age of persons who have typhoid fever, it should be borne in mind that there are more persons living at the earlier ages than at the more advanced ages. After the publication of the census of 1890, it will be possible to compare this table with one exhibiting the per cent of persons living in each period of age, and thus complete the study here provided for by this statement of facts relative to nearly two thousand three hundred cases of typhoid fever.

AGE OF OCCURRENCE OF TYPHOID FEVER.

TABLE 11.—*Exhibiting, by Sex and in certain Age-groups, the per cent of persons sick from Typhoid Fever in Michigan, during the five years and each of the five years, 1887-91; also the average age, and the number of cases included. (Compiled from such reports as stated the ages.)*

Sickness from Typhoid Fever.													
Year.	Sex.	Average age, Years.	No. of cases included.	Age,—In Periods of Years. Per Cent of Cases in each Period of Age.									
				All Ages.	Under 10 Years.	10 to 15	15 to 20	20 to 25	25 to 30	30 to 35	35 to 40	40 to 45	45 to 50	50 Years and over.
1887.	Males	24	316	100	10	10	14	20	17	9	8	4	2	4
	Females	22	245	100	17	10	20	15	10	10	5	4	3	5
1888.	Males	24	310	100	12	13	15	20	11	11	5	4	3	6
	Females	23	199	100	12	22	20	14	8	5	4	6	3	7
1889.	Males	24	362	100	13	11	17	25	10	8	6	3	2	6
	Females	23	310	100	16	17	20	12	8	7	7	4	4	5
1890.	Males	22	325	100	14	12	16	25	16	7	4	3	2	3
	Females	20	199	100	16	16	24	17	11	6	5	1	2	4
1891.	Males	23	393	100	11	11	16	26	17	8	4	2	2	3
	Females	23	557	100	13	20	21	15	10	6	3	3	3	5
Av. 1887-91.	Males	23	441	100	12	11	16	23	14	9	5	3	2	4
	Females	22	302	100	15	17	21	15	9	7	5	4	3	5

TABLE 12.—*Exhibiting, by Sex and in certain Age-groups, the Per Cent of Persons who Died of Typhoid Fever during the year 1891.*

Year.	Sex.	Average age, Years.	No. of cases included.	Per Cent of Deaths in certain Age-groups.										
				All Ages.	Under 10 years.	10 to 15.	15 to 20.	20 to 25.	25 to 30.	30 to 35.	35 to 40.	40 to 45.	45 to 50.	50 Years and over.
1891.	Males	27	120	100	12	5	15	26	15	6	8	2	3	7
	Females	28	79	100	5	20	16	16	10	5	5	3	4	15

The average age of all persons, both males and females, at death was 27.42 years.

It may be seen by Table 12 that to males the greatest danger of death from typhoid fever was in the period from 20 to 25 years of age; while the greatest number of females died during the period from 10 to 15 years of age.

TWO LINES OF EVIDENCE OF THE PREVALENCE OF TYPHOID FEVER.

In studying the prevalence of typhoid fever in 1891, from the facts presented in the preceding and following pages, it must be borne in mind that those facts are derived from two distinct sources of information:

1.—The numbers of outbreaks, of cases of sickness, and of deaths from typhoid fever are taken from special reports from health officers and other township, city and village officers, during the course of an outbreak, at its close, or in special reports at the close of the year. If all the people and officers reported as the laws provide, the facts presented would represent the *actual numbers* of outbreaks, cases of sickness, and deaths from typhoid fever which occurred in the State during the year; but *all* do not so report. It is just, however, to state that, as the people generally are becoming better instructed in the measures recommended by the State Board of Health for the saving of life and health, better and more complete reports are made year by year. So, each year, we believe that an increasing proportion of the cases of sickness and deaths from the dangerous communicable diseases are reported to this office. This tends towards an apparent increase in the prevalence of the disease each year, modified, of course, by the real fluctuation in prevalence. While waiting for perfect reports, the facts derived from those now received are valuable for purposes of study.

2.—The prevalence of typhoid fever, or of any given disease, as indicated by the "per cent of reports" is taken from the weekly postal-card reports from regular correspondents of the State Board, health officers of cities and villages, and others. The "per cent of reports" is the per cent of the whole number of reports received which stated the presence of the disease named; it gives the relative prevalence of the disease, under the observation of the physicians who report. It may represent the relative area of prevalence of the disease, combined with the relative number of weeks the disease continued where it did occur, *but not the actual number of cases.*

TABLE 13.—*Exhibiting the number of Inches of Earth above the ground water in Lansing, by months for the six years 1886-91, compared with the per cent of reported cases and outbreaks of Typhoid Fever in Michigan, for each month; also the total number of cases and outbreaks reported for those years. (Compiled from those cases of which the date of occurrence was given; and from those outbreaks of which the time of beginning was stated.)*

Specifications relative to ground water and Typhoid Fever.	Year.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	No. of cases and outbreaks included in this table.
Inches of earth above the water, year 1886	.....	276	278	274	272	273	277	282	287	287	286	291	294	.....
Per cent of cases of typhoid fever reported, year 1886*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Per cent of outbreaks which began in each month, 1886	100	6	4	4	2	2	4	11	15	26	11	11	5	253
Inches of earth above the water, year 1887	.....	296	287	280	282	285	288	290	291	291	294	297	294	.....
Per cent of cases of typhoid fever reported, year 1887	100	2	1	1	1	2	3	8	20	24	19	12	7	1,096
Per cent of outbreaks which began in each month, 1887	100	5	2	2	3	6	4	12	23	20	11	9	3	289
Inches of earth above the water, year 1888	.....	292	293	294	293	293	293	293	290	293	297	294	300	.....
Per cent of cases of typhoid fever reported, year 1888	100	5	3	2	3	3	4	7	13	18	23	11	9	609
Per cent of outbreaks which began in each month, 1888	100	7	5	3	3	4	6	12	15	16	15	6	7	265
Inches of earth above the water, year 1889	.....	298	304	304	302	304	299	299	302	305	308	311	312	.....
Per cent of cases of typhoid fever reported, year 1889	100	1	2	1	2	1	2	4	12	28	24	15	7	1,248
Per cent of outbreaks which began in each month, 1889	100	4	2	3	2	2	5	8	17	21	19	11	6	382
Inches of earth above the water, year 1890	.....	309	307	305	302	296	292	293	295	300	300	298	300	.....
Per cent of cases of typhoid fever reported, year 1890	100	5	2	2	3	2	2	7	23	18	17	12	6	1,089
Per cent of outbreaks which began in each month, 1890	100	5	4	3	3	6	5	9	25	13	15	6	5	253
Inches of earth above the water, year 1891	.....	302	305	301	295	294	296	297	300	300	304	306	306	.....
Per cent of cases of typhoid fever reported, year 1891	100	6	2	1	2	2	2	5	14	24	23	13	6	1,464
Per cent of outbreaks which began in each month, 1891	100	6	3	2	3	4	5	8	20	18	19	9	4	454

* The per cent of cases in each month was not completed in 1886.

The weekly card reports, however, furnish a valuable means of ascertaining, approximately, the relative prevalence of the several diseases in a given year, and the relative prevalence of a given disease in one year compared with other years, and it is as good a scheme for ascertaining the facts as is yet available. Therefore the sickness statistics based upon those weekly card-reports should be relied upon for a comparison of the relative prevalence of typhoid fever in 1891, compared with preceding years. However, the evidence from the two sources may well be compared.

A comparison of the evidence from the two sources, just mentioned, relative to typhoid fever during the years 1885–91, is facilitated by the following Table 14:—

TABLE 14.—*By years for the Seven Years 1885–91, the Per Cent of Reports (from regular correspondents to the State Board of Health, and others) Stating the Presence of Typhoid Fever in Michigan, also the numbers of Outbreaks, numbers of Localities of Outbreaks, the Cases of Sickness and the Deaths from Typhoid Fever for the Same Years.*

Years.	Per cent of Weekly postal Reports Stating the Presence of Typhoid fever.	Reported Outbreaks of Typhoid fever.	Reported Localities of Outbreaks of Typhoid fever.	Reported Cases of Sickness from Typhoid fever.	Reported Deaths from Typhoid fever.
1885	8	218	200	715	194
1886	8	290	282	1,194	282
1887	10	335	320	2,424	411
1888	10	316	296	*1,511	310
1889	10	432	398	2,530	402
1890	8	330	310	1,924	304
1891	11	543	501	4,670	697

* Inasmuch as it appears that the reported outbreaks and localities in which typhoid fever occurred in 1888 were not very much less than in the preceding year, and were even more than in the year 1886, it is possible that in 1888, the outbreaks of typhoid fever were not allowed to spread as much as in previous years.

Table 15 exhibits the average prevalence of typhoid fever in Michigan by year and months for the ten years, 1878–87, and for each of the seven years, 1885–91, as indicated by the weekly card reports made by regular observers. Table 16 exhibits the rainfall by months and years for the period of ten years, 1878–87, and for each of the seven years, 1885–91.

TABLE 15.—TYPHOID FEVER IN MICHIGAN.—*Average per cent of weekly card-reports stating the presence of Typhoid Fever, by year and Months for the Ten years, 1878–87, also in each of the seven years, 1885–91.*

Period of Time.	Year.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 10 yrs., 1878-87*	12	10	9	7	5	5	5	7	14	20	22	20	14
1885	† 8	11	7	5	4	3	5	5	6	11	13	16	8
1886	† 8	6	3	4	3	5	4	5	13	16	16	13	10
1887*	10	6	10	4	3	3	4	8	14	22	18	15	11
1888	10	10	7	6	5	4	5	7	12	18	16	12	10
1889	10	8	5	3	3	4	5	5	12	19	25	19	12
1890	8	6	1	2	2	2	5	6	15	15	16	13	7
1891	11	5	5	2	2	3	3	6	12	21	27	21	15

* The figures in the line for 1887, and in the line for the average for the ten years, 1878-87, in this table do not all exactly agree with those in the same lines in the table printed on page lvi. of the Report of this Board for the year 1888, for the reason that the table printed in the Report for 1888 was made before the cards were all compiled for the *year* and was taken from the compilation (of the card reports first received) for the quarterly reports. The line "Average 10 years 1878-87," included the data for the year 1887 and consequently is not exactly, although it is substantially, the same as in the above table.

† Since May, 1885, physicians have reported only the prevalence of diseases under their *own observation*. Previous to that time diseases which were *believed* to be present (under the care of other physicians) were so reported. This undoubtedly accounts for a part of the sudden decrease in 1885 and 1886 as compared with the preceding years.

TABLE 16.—RAINFALL IN MICHIGAN.—*Average number of Inches, by Months, for the Ten years, 1878–87, also in each of the seven years, 1885–91.*

Period of Time.	Year.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 10 yrs., 1878-87	37.27	2.09	2.89	2.28	2.49	3.52	4.24	3.44	3.21	3.72	3.45	2.98	2.69
1885	35.82	2.70	.78	.58	2.47	2.30	6.01	2.52	5.82	3.75	3.08	2 90	2.14
1886	32.16	3.05	1 72	2.74	2.40	2.58	2.29	1.36	4.21	5.36	1.97	2.85	2.13
1887	29.82	2.27	4.47	1.18	1.54	2.25	2.76	2.46	1.98	2.84	2.48	2.10	2.55
1888	29.55	1.99	1.77	2.51	2.15	3.73	2.87	2.02	2.38	2.66	2.68	2.92	1.89
1889	28.18	2.42	2.04	1.01	1.62	4.21	3.82	3.07	.98	1.85	1.10	3.10	2.96
1890	30.20	3.53	2 40	2.12	3.37	4.80	3.74	1.47	3.63	2.09	4.97	2.43	1.70
1891	31.66	1.91	3.13	2.74	2.03	1.33	2.53	2.55	4.41	1.92	1.71	4.86	2.54

Table 17 exhibits the relation of low water in wells to sickness (as shown by the weekly card reports) and the reported deaths from typhoid fever in Michigan, for the twelve years, 1878, 1880–90. The facts presented in two lines of this table, low water in wells and sickness from typhoid fever, for a ten year period, are graphically represented in a diagram on page 256 of the Annual Report of this Board for 1889.

The diagram, on page 266 of this Report, graphically represents the relation of the sickness from typhoid fever, to the rise and fall of the water in wells, in Michigan, for the twelve-year period comprising the years 1878 and 1880–90.

Comprehensive study of this subject was made by the Secretary of this Board in a paper read before the American Public Health Association, at St. Louis, Mo., Oct. 16, 1884, which was printed in the Annual Report of this Board for the year 1884, pp. 89–114, and the study was continued subsequently, in the Annual Reports of this Board for the years 1888, pp. lv–lvii; 1889, pp. 254–262; 1890, pp. 247–251.

The evidence is conclusive that there is a necessary relation between the low water in wells and the sickness from typhoid fever.

TABLE 17.—*Exhibiting, for Michigan, by Months, during the Twelve Years, 1878, 1880–1890,* the Relation of Low Water in Wells to Sickness from Typhoid Fever; also, the Reported Number of Deaths from Typhoid Fever.*

Month.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. inches of ground above the water in wells†	200	195	191	183	183	186	202	209	215	220	215	212
Fluctuation from Max. Depth of water in wells	17	12	8	0	0	3	19	26	32	37	32	29
Sickness from Typhoid fever‡	10	8	6	5	5	5	7	13	19	21	18	13
Av. number of reported deaths from Typhoid fever‖	24	21	24	25	24	22	27	58	92	101	72	54

* The data relating to the sickness and the deaths from typhoid fever in the years 1878, 1880-90, were used in order to coincide with the same period for which the measurements of ground above the water in wells were already obtained.

† The year 1879 could not be included as, for that year, there was no station from which reports were received for the whole year. The stations used in the compilation of this line, and the years for which reports were received and compiled from each are as follows: Elsie, 1878; Thornville, 1880-1 and 1885-7; Hillsdale, 1880, 1884, 1887-90; Mendon and Union City, 1880; Linden and Dearborn, 1881; Brockway Center, 1882 and 1883; Otisville and Woodland, 1882; Saginaw City, 1883; Kalamazoo, 1884, 1888 and 1889; Lansing, S. B. of H., 1885-90; Ann Arbor and River Raisin, 1886-90; Alpena, 1887-88; Otsego, 1887; Traverse City, 1888-90; Battle Creek, 1888.

‡ Per cent of weekly reports, from observers in different parts of the State, which stated the presence of typhoid fever.

‖ The data used in the compilation of this line were taken from the Registration Reports of Michigan.—Vital Statistics.

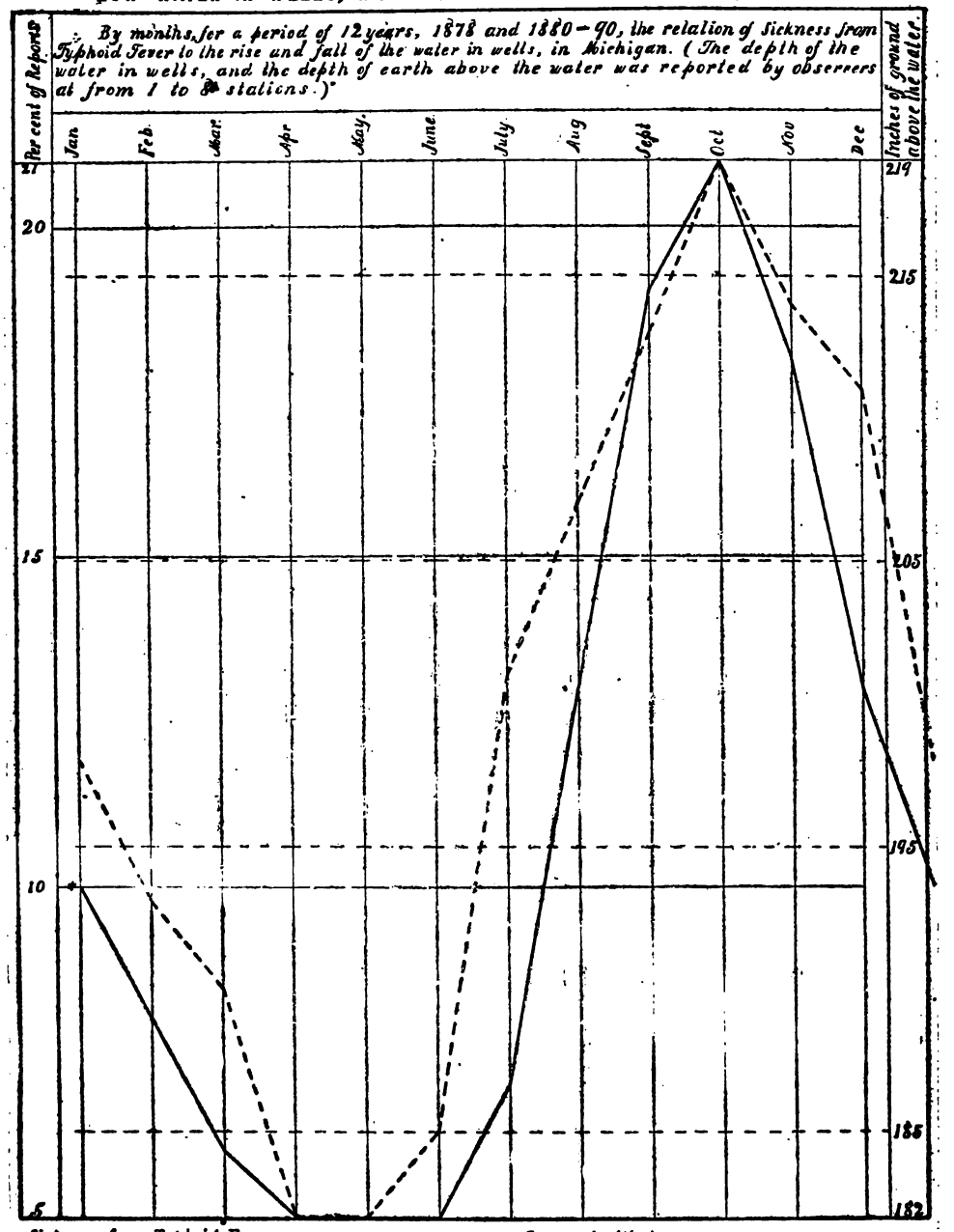
From January to May the fluctuations in the sickness from typhoid fever and the depth of the water in wells are nearly coincident. In June the increase in the sickness follows the decrease of the water with an interval of about a month. Thence during the rest of the year, the agreement of the two is very close. The maximum of sickness and the minimum of water are coincident in October.

The stations at which the measurements of water in wells are taken and the number of years which are available from each station are stated in the dagger (†) foot-note of Table 17, this page. The Office has been unable thus far to get accurate measurements of the height of water in wells for a long period of years from any Stations in Michigan. This absence of extensive data is especially deplored when a comparison of one year with a series of years is desired, but in the averages for a series of years by *months*, the evidence is accurate and valuable.

It is believed that all the wells from which measurements of water are made for this office, except the well at Lansing, are used. The well at Lansing is in the capitol grounds, far enough from other wells so as not to

MICHIGAN STATE BOARD OF HEALTH EXHIBIT.

LOW WATER IN WELLS, AND SICKNESS FROM TYPHOID FEVER, IN MICHIGAN.



Sickness from Typhoid Fever ———————. Ground Water – – – – – – – – – – – –.

*Indicating what per cent of all reports received stated the presence of Typhoid Fever then under the observation of the physicians reporting.

Over 35000 weekly reports of sickness, and over 500 observations of the depth of water in wells are represented in this diagram.

NOTE.—The danger from typhoid fever appears to be greatest in October, when the water in wells is lowest, that is, when there are the most "Inches of earth above the ground-water." The danger is least in May, when the water in wells is highest.

be liable to be affected by the rise and fall of the water in other wells from daily use, and so would more nearly represent the gradual rise and fall of the *ground water* than would measurements in wells from which water is drawn. But it has been found, by long-continued observations and investigations, that the rise and fall of the typhoid fever is in much closer relation to the fall and rise of the water in wells in actual use than to the fluctuations in the well at Lansing.

TABLE 18.—HEIGHT OF GROUND WATER.—*Inches of Earth above the Water—by months for the seven years, 1885–91, and for the last four months of the year 1884, and for each of the seven years, 1885–91, at* **Lansing,** *Mich.,—Well in the Capitol Grounds.*

Period of time.	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1885–91	293	294	295	293	289	289	289	291	293	294	296	296	297
1884	.....	.....	.....	.....	.....	.....	.....	.....	.....	290	291	293	292
1885	284	288	289	292	280	281	279	282	283	282	285	281	280
1886	281	276	278	274	272	273	277	282	287	287	286	291	294
1887	290	296	287	280	282	285	288	290	291	291	294	297	294
1888	294	292	293	294	293	293	293	293	290	293	297	294	300
1889	304	298	304	304	302	304	299	299	302	305	308	311	312
1890	300	309	307	305	302	296	292	293	295	300	300	298	300
1891	301	302	305	301	295	294	296	297	300	300	304	306	306

Table 18 exhibits the height of ground above the water in the well at Lansing, by months and year for the seven years, 1885–91. In table 20 the first line of table 18 is used, with the average line in the following table (19), together with the average sickness from typhoid fever during the same years.

TABLE 19.—TEMPERATURE OF THE WATER *in the Well at the State Capitol in* **Lansing,** *Mich., by Months for the seven years, 1885–91, and the last four months of the year 1884.*

Year and period of years.	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 7 Years, 1885–91	49	50	47	47	46	48	48	48	50	51	51	51	50
1884	.....	.....	.....	.....	.....	.....	.....	.....	.....	50	51	51	49
1885	47	49	47	48	42	46	48	47	48	50	50	51	45
1886	48	49	47	46	45	46	46	47	50	52	52	51	50
1887	48	50	41	42	46	47	48	49	51	50	51	52	51
1888	49	50	49	48	47	48	48	47	50	51	51	52	51
1889	50	50	49	49	48	49	49	50	50	50	51	51	51
1890	50	50	49	49	48	49	49	49	50	51	51	52	51
1891	50	50	49	49	48	49	49	49	50	51	51	51	51

TABLE 20.—*Sickness from Typhoid Fever in Michigan (as indicated by the Weekly Card Reports by all Observers) and the depth of Earth (in inches) above the Water in the Well, and the temperature of the water in the Well, at* **Lansing,** *Michigan, by Year and Months for the 7 Years, 1885-91.*

	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Sickness from Typhoid Fever*.....	9	7	5	4	3	3	4	6	12	17	19	16	10
Inches of earth above water in well.....	293	294	295	293	289	289	289	291	293	294	296	296	297
Temperature of water in well.....	49	50	47	47	46	48	48	48	50	51	51	51	50

* Per cent of all reports received (from observers in different parts of the State) which stated the presence of typhoid fever.

From table 20 it may be seen that the relation of sickness from typhoid fever to the ground water, as represented by the depth of water in the well at Lansing, is not so close as that which is shown to exist between sickness from typhoid fever and low water in wells in Table 16, on page 264 of this report. It is still possible, however, that if we could obtain measurements of water in *unused* wells in the different localities whence the reports of typhoid fever are derived, or could we have a full and correct report of all cases of the disease which occurred in Lansing during the same period for which we have measurements of the well there, and before there was a general water supply in Lansing, comparison of those data might show the existence of as close affinity between low *Ground-water* and typhoid fever, as exists between typhoid and *low water in wells.*

TABLE 21.—*Exhibiting the Average Total Annual Rainfall at Stations in Michigan the same for Lansing, the inches of Earth above the Ground Water at* **Lansing,** *the Inches of Water in an undisturbed Well at Lansing, and the Reported Sickness from Typhoid Fever in Michigan, as indicated by the per cent of all the weekly card-reports which stated the presence of Typhoid Fever, during the 7 years and each of the 7 years, 1885-91.*

Year, and period of years.	Average Total Annual Rainfall at Stations in Michigan, in inches.	Total Annual Rainfall at Lansing, in inches.	Inches of Earth above the Ground Water at Lansing.	Inches of Water in an unused Well at Lansing.	Ground Water, higher (+) or lower (—) than the seven years' Average in inches.	Average Per Cent of all Weekly Card-Reports Stating the presence of Typhoid Fever.	More (+) or less (—) Sickness from Typhoid Fever than the seven years' average.
Av. 7 Years, 1885-91.	31.06	29.45	293	31	=	9	=
1885.....	35.82	34.51	284	40	+ 9	8	—1
1886.....	32.16	29.52	281	42	+11	8	—1
1887.....	29.82	30.08	290	34	+ 3	10	+1
1888.....	29.55	25.76	294	29	— 2	10	+1
1889.....	28.18	23.28	304	19	—12	10	+1
1890.....	30.20	33.96	300	28	— 3	8	—1
1891.....	31.66	29.05	301	23	— 8	11	+2

TYPHUS FEVER.

REPORTED IN MICHIGAN DURING THE YEAR 1891.

One case of this disease was reported during the year 1891. Dr. C. Van Zwaluwenburg, health officer of the city of Kalamazoo, in his final report, dated June 3, and letter dated June 10, 1891, states that: A case of typhus fever had arrived in that city on May 8, and died soon after its arrival there. The case was isolated; burial was private, no funeral being held. No other cases occurred. He adds, in a postscript:

"Dr. W. B. Southard, who attended the case, tells me that so little time elapsed, between the arrival here and the death, that but little could be done in the way of disinfection. The petechia were a marked feature of the case."

June 4, 1891, the Secretary wrote as follows:

"*Lansing, Mich., June 4, 1891.*

"C. VAN ZWALUWENBURG, *Health Officer of the City, Kalamazoo, Mich.:*

"DEAR SIR:—Please accept thanks for your final report dated June 3, relative to typhus fever, which occurred April 20.

"Your report says—'was 15 days on board ship.'

"If possible to ascertain, I would be glad to know—(1) The ports of departure and arrival of the ship? (2) On what ship? (3) Just when the ship reached the port of arrival? (4) The name of the patient? and (5) The age, sex, or (if exact age not known) whether man, woman or child.

"Very respectfully,

"HENRY B. BAKER, *Secretary.*"

In answer to the above letter Dr. Van Zwaluwenburg wrote on June 10, as follows:—

"In answer to yours of June 4, would say: That case of Typhus fever occurred in a child eleven months old, Jan Vroegindewey, by name. The family hail from Middle Harnis, Prov. of Holland, Netherlands. They sailed from Amsterdam in steamer 'Amsterdam' of the Netherlands Line on April 18, 1891, arrived in New York on May 3, 1891, after a protracted voyage, on account of adverse winds, but little hard storm.

"The vessel was very much crowded with emigrants, many of them being Germans and Italians. The mother tells me that everything was in prime order and cleanliness, when they started, but before they landed it was very foul. The food was good, but the child did not seem to do well on the condensed milk, which was all it took.

"There was no sickness on board that the mother knew of, but the child was not well during the journey, still, it was not taken down until May 8, and died May 11.

"The child was semi-comatose from the beginning, but could be aroused and then it was quite bright. The mother said it was covered with an eruption which suggested measles to her, but on further inquiry she said it appeared almost exclusively on the chest and abdomen. There was no redness of the eyes and no cough."

CONSUMPTION.

IN MICHIGAN DURING THE YEAR 1891.

During the year ending Dec. 31, 1891, the weekly card reports from health officers, showed a slight decrease in the prevalence of consumption as compared with the previous year, also a slight decrease in 1891 compared with the average for the five years, 1886–1890. It will be seen by referring to line 6, of Exhibit IV., of the article on the "Statistical Study of Sickness in Michigan in 1891," on page 89 of this report, that, of 4,291 weekly reports received at this office, from the 145 observers in different parts of the State, during the year 1891, 2,102 or 49 per cent of the whole, stated the presence of comsumption in the localities from which the reports were received; this exhibit also shows the prevalence of the disease in 1891, as compared with each of the former years since 1879.

For some years the State Board of Health had been considering the best means for the restriction of consumption. During those years the Secretary had several times read to the Board a proposed circular, which was modified from time to time, dealing with consumption as a communicable disease, and pointing out to the people the ways in which the disease is spread, and the best measures for its restriction. Finally, at the meeting of the Board in July, 1891, a satisfactory document was presented, and, in September, 1891, after slight amendments it was printed, as a four-page-leaflet, and its distribution throughout the State, for the instruction of the general public, was commenced. Copies were sent to the newspapers in different parts of the State, with the hope that the press would aid in disseminating the important information.

The circular was commented upon by a number of newspapers in the State. Among others was the following article, which appeared in the Sault Ste. Marie News, of October 3, 1891:—

GUARD AGAINST CONSUMPTION.

"Consumption is a most common and fatal disease and in Michigan alone annually causes the death of 2,000 to 2,500 persons. Much of this mortality can be prevented by necessary precautions. The mode of restriction and prevention of this disease, which is communicable, is explained in a leaflet just issued by the Michigan State Board of Health. The News makes some extracts therefrom in the hope that those who are interested in the subject will act upon the suggestions given."

It then quoted extensively from the circular.

A copy of the four-page leaflet is as follows:—

RESTRICTION AND PREVENTION OF CONSUMPTION.

Sometimes called "Tuberculosis," "Phthisis," "Phthisis Pulmonalis," "Tubercular Phthisis," "Tubercular Consumption," or "Pulmonary Consumption."

LEAFLET ISSUED BY THE MICHIGAN STATE BOARD OF HEALTH.

[175.] FIVE THOUSAND, SEPTEMBER, 1891.

Consumption is the most common and fatal disease. In Michigan, it causes more deaths than any other disease. According to the Registration reports, issued by the Secretary of State (1887, p. 231), the average annual number of deaths from consumption in this State for the nineteen years, 1869–1887, is 1,698; but it is believed that not more than two-thirds of the deaths are reported, so that the number of deaths which actually occur in Michigan from consumption is probably over twenty-five hundred per year. A large part of this mortality can and ought to be prevented.

Consumption is now known to be a communicable disease, in which, frequently, the contagium is carried from the dried sputum of a consumptive to the lungs of a susceptible person, where it grows and multiplies and thus produces the disease. The germ which causes consumption is called the *Bacillus tuberculosis*, and it is present in the sputa of consumptives. These bacilli are from about one twenty-thousandth to about one ten-thousandth of an inch in length, and have a breadth about one-sixth of their length. (From 1.5 to 3.5, by .4 micromillimeters.) These bacilli have been thoroughly studied, and repeated successful inoculations have been performed on lower animals. Interesting experiments have been made in this connection by Dr. George Cornet, of the Berlin Hygienic Institute, with the dust of rooms inhabited by consumptives. Dust, collected from those surfaces not likely to be contaminated directly by the spitting or coughing of the patient, was mixed with sterilized bouillon and injected into the peritoneal cavity of guinea pigs. Forty days later the animals were killed, and a careful necropsy was made. Twenty-one hospital wards, in which there were consumptive patients were examined in this way, and from the dust of fifteen of them, tuberculosis was set up in the guinea pigs experimented upon. Private houses where consumptives lived gave similar results; where patients had been in the habit of expectorating on the floor, the dust from the walls was certain to yield infectious cultures, but where cloths or spittoons had been used this was not the case.

The mode of communication of this disease is mainly from the dried sputa from consumptives. The germs in the sputa are carried into the air by sweepings, and deposited upon walls or contents of rooms, or find their way to the lungs of persons.

Destruction of the Sputa.—It is evident that the only certain preventive of consumption is to destroy the sputum from the consumptive before it has an opportunity to dry and scatter the seeds. It is for the consumptive's own safety to destroy the sputa, because it reduces to a minimum the possibility of re-infection. Any person who has an habitual cough, and

raises sputa, should have a microscopical examination of the sputa, to ascertain whether it contains the *bacillus tuberculosis*. Without waiting for such examination, in all such cases the sputa should be disinfected.

How the Sputa Should be Destroyed.—No consumptive should expectorate on the floor. Cuspidors, in hotels and other public places and in rooms occupied by consumptives, should be partly filled with water. They should be washed twice each day in boiling water, and the contents should be disinfected with a solution of bichloride of mercury. The cuspidor might well contain constantly a disinfectant, such as a five per cent solution of carbolic acid,—one ounce of carbolic acid dissolved in a pint and a half of water.

The consumptive should carry small pieces of cloth (each just large enough to properly receive one sputum) and paraffined paper envelopes or wrappers in which the cloth, as soon as once used, may be put and securely enclosed, and, with its envelope, burned on the first opportunity.

Destruction of the Dejecta.—All dejecta of a consumptive person should be destroyed or disinfected; because it has been shown that the bacilli are to be found in the urine of persons having tubercular disease of the urinary organs, and in the fæces of those having tubercular disease of the bowels, and they may be in the fæces of those who swallow sputa containing the bacilli, that is, possibly, of any consumptive. Disinfect each discharge from the bowels by thoroughly mixing with it at least one ounce of chlorinated lime in powder, or one quart of "Standard Solution No. 1" recommended by the American Public Health Association's Committee.*

Ventilation of buildings.—Through better systems of ventilation, much may be done for lessening the number of micro-organisms inhaled with the dust of floors, carpets, etc., especially by having the foul-air exits at the floor level, so that the general motion of the foul air shall be downwards, and not upwards into the nostrils of the inmates of the room. This is especially important with reference to all public buildings, as, also, that they shall constantly have a liberal supply of fresh air.

Personal precautions.—Those who sweep and dust rooms which consumptives have occupied might well use respirators. Much may be done to lessen the liability to contract consumption by having the sanitary surroundings as nearly perfect as possible, and by keeping the lungs strong and healthy. It is stated that "in no less than sixty per cent of all patients dying at Bellevue Hospital there were old tubercular changes in the lungs, the disease having been recovered from." Similar observations have been made at the Philadelphia hospital, and at the Paris morgue. Dr. Trudeau's experiments prove that rabbits inoculated with the *Bacillus tuberculosis* and kept in a cellar-like place, on restricted diet, died of the disease in much greater proportion than did similar animals similarly inoculated but kept in the open air with abundance of food. These facts emphasize the importance of pure food, pure air, and healthful exercise.

Exposure to cold should be avoided.—Statistics of sickness and of deaths, collated with meteorological statistics, seem to prove that the consumptive processes go on most actively after times of low atmospheric temperature, and least actively after times of high atmospheric temperature. This makes it important that consumptives, and persons susceptible to consumption, should especially guard against the inhalation

* "Standard Solution No. 1" is made by adding to each gallon of soft water four ounces of chloride of lime of the best quality, which should contain at least 25 per cent of available chlorine. "Use one quart of this solution for the disinfection of each discharge in cholera, typhoid fever, etc. Mix well and leave in vessel for at least one hour before throwing into privy-vault or water-closet."

of cold air. It enforces the importance of having such persons spend the winter and spring months in a climate warmer than that to which they have been accustomed.

Disinfection.—The dusting of objects in the room, the cleansing of floors, walls, and ceiling of the living and sleeping rooms of persons suffering from pulmonary consumption should be deferred until after the room and contents have been subjected to the fumes of burning sulphur.

The unwashed clothing of a consumptive should not be mingled with the unwashed clothing of another person; care should be taken that the handkerchiefs be boiled, that other articles liable to harber the bacillus shall be disinfected, and that no virus come in contact with a cut or injured hand.

No one should sleep in the same room with a consumptive patient; or in a room which has been occupied by a consumptive, unless the room has been previously subjected to the fumes of burning sulphur. A room which has been occupied by a consumptive person may well (with all its contents) be thoroughly disinfected, first subjecting it, for twenty-four hours, to strong fumes of burning sulphur, and then it should for several hours be exposed to currents of fresh air. After fumigation the walls may be rubbed with bread crumbs, which should then be burned.

Rooms to be disinfected by sulphurous fumes must be vacated. For a room ten feet square at least three pounds of sulphur should be used; for larger rooms proportionately increased quantities, at the rate of three pounds for each one thousand cubic feet of air-space.

Hang up and spread out as much as possible all blankets and other articles to be disinfected; turn pockets in clothing inside out, and otherwise facilitate the access of the sulphurous fumes to all infected places.

Close the room tightly, place the sulphur in iron pots or pans which will not leak, supported upon bricks over a sheet of zinz or over water in a tub or pan, so that in case melted sulphur should leak out of the pot the floor may not be burned; set the sulphur on fire by hot coals or with the aid of a spoonful of alcohol lighted by a match; be careful not to breathe the fumes of the burning sulphur, and when certain the sulphur is burning well leave the room, close the door, and allow the room to be closed for twenty-four hours.

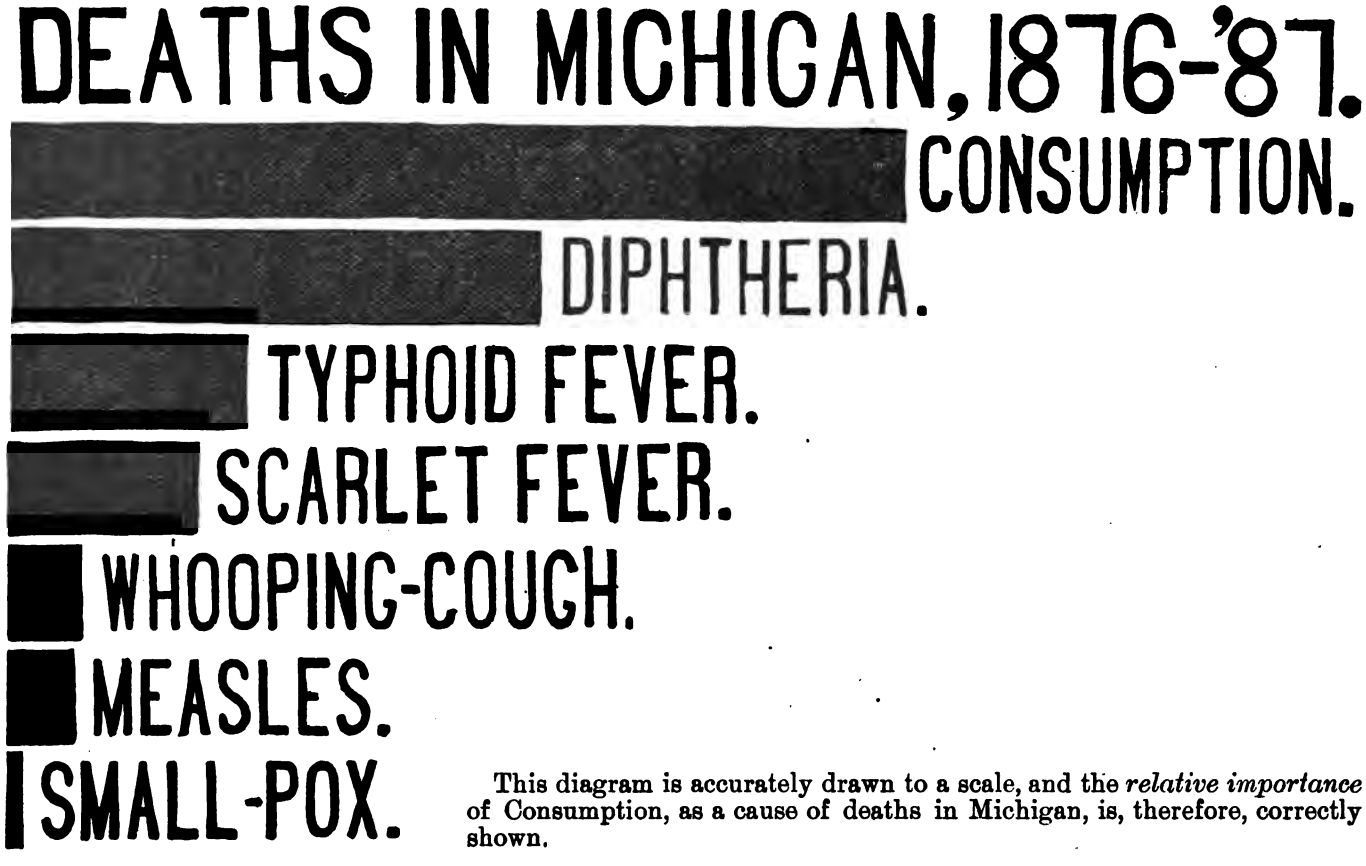
Boil milk from suspected sources.—While by far the greater numbers of cases of consumption are caused by the inhalation of the germs of the disease from the dried sputa, the disease may be communicated by the use of milk from tubercular animals. The bacilli of consumption have been found in the milk of cows affected with tuberculosis, even where there was no evidence of localized tuberculosis of the udder. Experiments indicate that, while heating the milk to 167° F. so weakened the virus that six rabbits which drank the milk did not show any traces of the disease, boiling the milk will destroy these germs. These experiments render it important that all milk from suspected sources be boiled before being used.

Tuberculous Meat.—The Paris Congress, for the study of tuberculosis in man and in animals, voted almost unanimously that the flesh from tubercular animals should be destroyed, even where the disease is only localized, if a large part of the organ is affected. Not only should all meat from tubercular animals be destroyed, but all meat from an unknown source should be thoroughly cooked.

The law in this State prohibiting the sale of diseased meat is as follows:

SECTION 1. If any person shall knowingly sell any kind of diseased, corrupted, or unwholesome provisions, whether for meat or drink, without making the same fully known to the buyer, he shall be punished by imprisonment in the county jail not more than six months, or by fine not exceeding two hundred dollars.—§9316, Howell's Statutes.

Collection of Information.—Health officers and physicians in Michigan are requested to continue to send to the office of the State Board of Health, at Lansing, each year, information concerning cases under their observation where consumption appears to have been communicated, directly or indirectly, from one person to another, the relation between the individuals, the presence of family predisposition, if any, and other interesting facts in connection with such cases.



This diagram is accurately drawn to a scale, and the *relative importance* of Consumption, as a cause of deaths in Michigan, is, therefore, correctly shown.

WHOOPING-COUGH IN MICHIGAN.

DURING THE YEAR ENDING DECEMBER 31, 1891.

During the year ending Dec. 31, 1891, the occurrence of 2,360* cases of sickness, and 101 deaths from whooping-cough was reported to the Secretary of the State Board of Health. The disease was reported to have prevailed in 162 localities, in 59 counties, with an average (exclusive of Detroit) of 14.6 cases and 0.5 of one death per locality. About 3.6 per cent of the reported cases were said to have proved fatal. The greatest number of cases reported to have occurred in one locality, was 300, in the city of Ishpeming, and the greatest mortality rate reported to have occurred in one locality was in Hesperia village, Newaygo county, where ten cases were reported to have proved fatal.

Relative to the source of contagium of the disease, it was reported in 27 instances as from a former case, in two instances as "epidemic," in 32 instances as "unknown," in two instances as "sporadic," and in 99 instances no statement was made in regard to it.

Although there annually occur many cases of sickness and a considerable number of deaths, from this disease in Michigan, but little effort seems to be made towards its prevention or restriction. In only three instances, reports stated that isolation of those sick with the disease had been resorted to.

There seems to exist a very common feeling that whooping-cough is an infantile disease, which all children must sooner or later contract, and that it is not a very fatal disease.

While it is true that whooping-cough is not so frequent a cause of mortality as scarlet fever, diphtheria and typhoid fever; yet it should be borne in mind that it is a communicable disease which causes more deaths in Michigan than does small-pox, and that it is largely preventable.

If in the 162 localities where the disease occurred in this State in 1891 prompt isolation of first cases had been enforced, it is probable that over 2,000 cases of sickness, and a large proportion of the 101 deaths which were caused by this disease would have been prevented, and the consequent suffering and expense avoided.

* The number of *cases* which occurred in Detroit was not reported, consequently only the 16 cases which proved fatal are included in the 2,360 reported cases. If the cases in Detroit bore the same ratio to deaths as do the cases to deaths in the rest of the State, there were 445 cases in that city, making a total of 2,805 cases in the State, instead of 2,360 as here given.

DYSENTERY IN MICHIGAN IN 1891.

In the year ending Dec. 31, 1891, one report relative to dysentery, was made to this office, by Dr. C. D. Parsons, of Burr Oak, St. Joseph county, wherein, he stated that members of a family under his care had been suffering from dysentery, which he suspected as having been caused by the use of water, taken from a well near the house. The patients had characteristic dysenteric stools, containing mucus, and blood. The Secretary of this Board was desirous of having a thorough examination made of the water used, and of the dysenteric stools, for the amœbæ, which is supposed to cause the disease, but all cases had so far recovered, that the characteristic stool could not be obtained.

On receipt of the above-mentioned report, the Secretary of this Board wrote to Doctor Parsons as follows:—

"Your letter of August 17, should have had earlier reply, but I have been absent from the city, attending a Sanitary Convention, at Negaunee, and in some manner your letter has escaped attention. For this, I am very sorry, especially as the conditions you describe, seem to supply an opportunity which has been needed, to complete a very important investigation, as to the cause of dysentery.

"Kartulis, of Alexandria (*Centralblatt für Bacteriologie und Parasitenkunde*, March 21, 1891), claims to have proved that the sole cause of dysentery is animal micro-organisms,—amœbæ. He cultivates these in a steralized infusion of straw; but says: 'It yet remains for some one to find the amœbæ outside the body.' 'Kartulis thinks it is probably to be found in water.' Your account of the cases seems to indicate that they are to be found in the water of the well which supplies the family with water; and I think it *very important* that the water of the well be carefully examined for that purpose; accordingly, I copy from the Medical News, Phila., May 16, 1891, a description of how to cultivate the amœbæ from the dysenteric stools, and I hope, if there is any dysentery left under your observation, that you will undertake to investigate the discharges in order to find the amœbæ, and whether there is dysentery there or not, I hope that you will investigate the *water from that well*."

How to do this is indicated by the following quotation:

"'After a number of experiments, Kartulis found that the best medium for the cultivation of the amœbæ was prepared by boiling for fifteen minutes, twenty or thirty grammes of fresh straw, in two liters of water. The fluid is then filtered and sterilized. Large-sized test-tubes, holding 50-100 c. cm., may be used, and are filled with the fluid. A few drops of the slimy masses in a fresh dysenteric stool are then mixed with the fluid in the tubes, which should be kept in an incubator at a temperature of 86° or 100° F. After the lapse of twenty-four or forty-eight hours there forms on the surface of the tube a film like spider's web, which consists of freshly developed amœbæ, in addition to many bacteria. The amœbæ grow best when the vessels are left exposed to the air. The amœbæ of the cultures are much smaller than those of the stools, have a lively movement in wandering spore form, but throw out no pseudopods. Ciliæ are absent, but nucleus and vacuoles are very distinct, especially when the bodies are stained with aniline colors. Here and there are seen some amœbæ, which are like in form and size those used for inoculating the tube. Very often, also, there are seen small forms, round, homogeneous, and glistening, which have a rapid and dancing motion. These take the aniline colors intensely, and Kartulis regards them as free nuclei.

"'The spores gradually develope to large amœbæ. The amœbæ then execute movements, by throwing

out pseudopods. Toward the fourth and fifth days there are seen between the lively amœbæ, forms which are much smaller, about the size of the white blood corpuscle. They are round, quiet bodies with a fine contour, small nucleus, and fine protoplasm. The forms become smaller gradually, form two contours, which appear yellowish, with dark protoplasm. Their sizes vary between 5 and 7 m. As amœbæ develop from these forms, there is no doubt that they are spores. Within eight or eleven days the spores increase; the amœbæ are very sparingly present.'

"I shall be glad to hear from you at once, whether you can undertake these investigations. There is opportunity for an important addition to sanitary science."

Aug. 31, the Secretary received the following letter from Dr. Parsons:—

"I send two quart bottles of water, from well, as you direct. Forgot to say in my letter that the cistern was only 3½ feet from well; the cement is cracked, and it leaks, which might account for contamination of the well.

"This water does not have as much odor as it did 3 weeks ago; perhaps will find nothing wrong with it. I could not obtain any of the dysenteric discharge as character has changed, it has not been bloody for several days, and has a more natural look. If I can obtain specimen that would have dysenteric mucus, will send it in few days."

MUMPS (PAROTITIS) IN MICHIGAN IN 1891.

Reports have been received, by the Secretary of the State Board of Health, of two outbreaks of mumps, in two localities in Michigan, during the year ending Dec. 31, 1891, which resulted in about 56 cases of sickness from that disease.

The first outbreak, which became epidemic, was in Marion township, Sanilac county, and included about 50 cases. The second outbreak was reported from LeRoy township, Ingham county, in which there were six cases.

The reports of the health officers are given in detail below:

Mumps in Marion township, Sanilac county.

Jan. 18, 1891, Dr. H. F. Alderton, health officer of Marion township, Sanilac county, wrote to the Secretary of this Board as follows:

"The mumps have been in this township for a month or more, but there has been no report until now. The reason is that there have been no bad cases, and physicians have not been called.

"It is of no use to take measures to prevent its spread, as there are people on the streets and in public places who have the disease."

Feb. 1, 1891, Dr. Alderton again wrote to the Secretary as follows:

"There are patients on the street every day who have the mumps. There have been upward of 50 cases, but only two have called in a physician."

And April 11, 1891, Dr. Alderton wrote to this Office again as follows:

"In regard to the mumps, is it necessary to report this disease? There have been cases in this township for a long time (all winter), but there have only been three cases where physicians have been called.

"I report herewith a case which I was called to see because the patient took cold and there were complications. To attempt to prevent its spread would be useless, because, there are persons on the street every day who have the disease."

Mumps in Le Roy township, Webberville Village.

Dec. 7, 1891, F. A. Turner, M. D., health officer of Le Roy township and Village of Webberville, reported to the Secretary of this Board, relative to an outbreak of mumps, substantially as follows:

"The first case was taken sick on Nov. 20, 1891. The number of cases up to Dec. 7, 1891, was six. Precautionary measures against its spread were taken.

"Recovery in each case, but all were very sick."

CORRESPONDENCE RELATIVE TO MEMBRANOUS CROUP.

Nov. 12, 1891, the Secretary of the State Board of Health received a letter, from Dr. W. G. Saunders, health officer of the city of Grand Rapids, regarding the important question of taking precautionary measures in cases of membranous croup. The following are copies of Dr. Saunders' letter and the Secretary's reply thereto:

"*Grand Rapids, Mich., Nov. 11, 1891.*

"HENRY B. BAKER, M. D., *Sec'y State Board of Health, Lansing, Mich.:*

"DEAR DOCTOR:—Are the State Board requiring private funerals in cases of membranous croup? I have prohibited funerals in such cases same as in diphtheria.

"Some persons seem to think I am too particular; will you please tell me what is advised in such cases.

"I am truly yours,

"WM. G. SAUNDERS,

"*Health Officer, Grand Rapids.*"

"*Lansing, Mich., Nov. 12, 1891.*

"WM. G. SAUNDERS, M. D., *Health officer of the city, Grand Rapids, Mich.:*

"DEAR DOCTOR:—In response to your letter of Nov. 11, relative to membranous croup:—

"Resolutions have been adopted by this Board to the effect that the local health authorities, in their efforts to restrict dangerous communicable diseases, in every case, give the public safety the benefit of the doubt, and in localities where diphtheria is present to regard cases of acute sore throat as suspected cases of diphtheria.

"It is often impossible to discriminate between cases of diphtheria and membranous or inflammatory croup, and it is the opinion of this Board, that the same precautions should be taken to restrict that disease as are taken to restrict diphtheria.

"I enclose two pamphlets with the resolutions referred to marked.

"Very respectfully,

"HENRY B. BAKER,

"*Secretary.*"

ERYSIPELAS IN MICHIGAN IN 1891.

During the year ending Dec. 31, 1891, the weekly reports from health officers showed a slight decrease in the prevalence of erysipelas in the State.

Dr. H. V. Tutton, health officer of Benton Harbor, Berrien county, made a special report on Oct. 2, 1891, of a case of erysipelas, in which he wrote substantially as follows:—

"The patient, a female, 37 years old, was taken sick on Sept. 28, 1891. The case was isolated and precautionary measures taken, by means of thorough disinfection of all clothing, cloths, etc., that had any connection with affected parts."

CHICKEN-POX (VARICELLA), IN MICHIGAN IN 1891.

During the year ending Dec. 31, 1891, there were reported to the Secretary of the State Board of Health, four outbreaks of chicken-pox, in the following-named four localities of Michigan: Ashton, Osceola county, 5 cases; Otsego, Allegan county, several cases; De Witt, Clinton county, 1 case; Morley, Mecosta county, several cases.

Details relative to the above-mentioned outbreaks are given below, as reported by the health officers:

Chicken-pox in Ashton, Osceola county.

The following letter, dated Feb. 6, 1891, was received by the Secretary of this Board, from Dr. A. Mulholland, Jr., health officer of the village of Ashton, Osceola county:

"Enclosed please find report of chicken-pox cases; I consider these diseases, such as mumps, chicken-pox, etc., dangerous to the public health, and of course, are contagious. Do you wish them reported always, and the usual precautions taken, to prevent their spread?

"Please send me some more blanks, also, about 50 copies each of documents Nos. 106 and 110, for general distribution."

Chicken-pox in Otsego, Allegan county.

March 30, 1891, information was received at this office, from Dr. L. E. Clark, health officer of Otsego, Allegan county, of a suspected case of small-pox in his jurisdiction. The Secretary sent printed instructions for the restriction and care of small-pox, and on April 2, 1891, wrote to Dr. Clark, as follows:

"With further reference to the subject of your letter of March 30, I would be glad to learn the following, concerning the first person or persons taken with the disease supposed to be either small-pox or chicken-pox:—

"(1) Was there known exposure to small-pox?

"(2) Had patient or patients been away from the village; if so, where?

"(3) Had patient or patients been handling old rags, or working in the paper-mill?

"Enclosed please find stamped envelope for reply."

April 4, 1891, the following answer to the Secretary's letter of April 2, was received, from Dr. Clark:—

"Am glad to report that our suspected case of small-pox was chicken-pox. Patient had been at work in paper-mill, on paper, but since her case, several others have been found, so don't know where it was contracted."

Chicken-pox in DeWitt, Clinton county, and Morley, Mecosta county.

July 20, 1891, one case of chicken-pox was reported by Dr. Lorenzo E. Worden, health officer of DeWitt, Clinton county. Measures were taken to prevent the spread of the disease, "by posting notices of the case."

Aug. 12, 1891, J. McNeece, M. D., of Morley, Mecosta county, reported to this Office as follows:—

"There are a number of cases of Varicella here."

Chicken-pox is of interest to the Sanitarian because small-pox is so frequently thought to be chicken-pox. In every instance such a disease should be dealt with in a way to ensure its restriction until it is certainly known that the disease is not small-pox.

ALLEGED LEPROSY IN MICHIGAN.

During the year ending Dec. 31, 1891, there have been rumors, and in one instance sensational, although fictitious, details, of lepers residing in different localities in Michigan. Most of these rumors have first appeared in sensational newspapers, and have caused more or less unnecessary alarm, although usually not in the localities in which the alleged cases were supposed to reside.

Rumors and reports of this nature, have been investigated by the Secretary of this Board, and in each case, have failed to be substantiated by the facts. The following-named localities in Michigan have each been alleged to contain a case of leprosy:—

Evart, Osceola county; Clare, Clare county; Houghton, Houghton county.

A few of the newspaper reports, letters from health officers, and communications from parties living in the neighborhood of suspected cases, with the correspondence of the Secretary of this Board, relative to the above-mentioned reports, are given below:—

A Suspected Case of Leprosy in Evart, Osceola County.

The following correspondence relative to the above-mentioned case will give an idea of the subject:—

"EVART, MICH., *August 22, 1891.*

"*Secretary of the State Board of Health, Lansing, Mich.:*

"SIR:—Some seven or eight years ago a copy of the New York Sun contained an account of a correspondent's visit to the Leper Asylum in New Brunswick. I showed the article in question to our local physicians, one of whom confidentially told me, that in his opinion there was a well-developed case of leprosy in this village, in the person of a widow, who has a family of children, some of whom are now of mature years.

"I have no acquaintance with the family myself, but those who have known and been intimate with said family, say that said widow has not a whole finger on her hands, and that now there is a running sore on one of her ankles.

"The woman once visited Ann Arbor and was told there was no help for her. The family is in comfortable circumstances.

"Our doctors here would probably tell you I am a crank were you to send them this communication, but the facts are as they are, and as the children of said woman are attending school here, when in session, perhaps you will consider it worth while to investigate the case.

"It will do no good to send a letter of inquiry to one of our local doctors. Please keep my name out of any inquiry you may institute concerning the case. Respectfully, _____."

Aug. 27, 1891, the Secretary wrote to a reputable physician as follows:—

"Will you have the kindness to inform me whether or not there is a case of leprosy in or near Evart; and, if there is, to give me any facts which will be of interest in a public-health way?

"Also will you have the kindness to inform me, if practicable, whether Mrs. ———, widow of ———, has or has not leprosy?

"Your communication will be considered confidential, to the State Board of Health, if you so request it.

"Herewith, please find a stamped envelope for your reply."

Sept. 2, 1891, the Secretary received the following answer, dated August 31, to the above letter:—

"Your favor of last week came duly to hand, and I embrace the first opportunity to answer it. With reference to the general inquiry which you made, I have no report to make.

"Concerning Mrs. ———, I would say that a few years ago she was sent, by her husband who is now dead, to Ann Arbor for treatment, being afflicted just the same then as now. It seems very strange to me that those standing at the very head of the medical profession of the State should be so careless or criminal, call it which you may, as to have a leprous patient under their treatment for a year or more, and discharge it, uncured, to spread its deadly contagium to its own and neighboring families.

"It is a mystery to me who has reported the case, or who has suggested me as the one to report it. There are some questions of vital interest clustering around this case, which involve more than physical health or welfare, and I should have to see my way very much plainer than at present, to wish to put myself into a position, to be able to pronounce Mrs. ——— the victim of that malady.

"She has two daughters just budding into womanhood, who, by her removal, would be left under dangerous circumstances, without a mother's watchful care, which might lead them into a worse leprosy than that which destroys the body.

"I should like to know whether it is the health officer, or some other practitioner, who has acquainted you with this peculiar case (for it is a very singular case indeed).

"If you feel disposed to communicate with me further, I should be glad, if desirable, to explain what I have hinted at, especially if the information was furnished you by a certain M. D. whom I suspect of doing the act.

"Awaiting your further pleasure, I remain,

"Dr. —— ———."

In response to the above letter the Secretary wrote, Sept. 2, 1891, as follows:—

"*Lansing, Sept. 2, 1891.*

"Dr. ————:

"Dear Doctor:—Accept my thanks for your letter of August 31, in reply to my questions relative to an alleged case of leprosy in Evart. It would not be proper for me to give the source of the first information on this subject, and I note what you say about a possible 'worse leprosy than that which destroys the body.' However, my belief is that leprosy can be restricted without breaking up families, it being apparently one of the diseases most easily restricted. I think that here, as elsewhere, 'knowledge is power,' and that much is to be gained and nothing lost through a thorough knowledge of the facts in the case.

"I shall be very glad to receive from you any facts bearing upon this subject which you may be able to communicate. Very respectfully,

"HENRY B. BAKER,
"*Secretary.*"

The following reply was received Sept. 17, by the Secretary:—

"In reply to yours of Sept. 2, I would say that I feel a very great delicacy in communicating anything concerning the case referred to.

"A number of years ago, before she was sent to Ann Arbor for treatment, I treated Mrs. —— —— for a disease which I regarded as a kind of lupus; it attacked the fingers, at that time, if I remember aright, being confined to those parts. The fingers were literally eaten off by the disease to the first or second joint.

"She, not being much benefited by my treatment, was sent to Ann Arbor, as I before stated, from where she returned, after about a year, still not much improved. Since then I believe the disease has attacked the lower extremities, but to what extent it has progressed I am unable to say.

"I must admit that I have, in thinking about that, and similar cases, come to the conclusion that it must be more than kin to leprosy.

"She has two daughters and a son, all of whom appear, at present, to be healthy and vigorous. The son, a year or so ago, did manifest some evidence or sign of tuberculosis pulmonalis, but has since apparently fully recovered.

"As I intimated to you before, I shall not allow my name, if possible to avoid it, to be used in breaking up this family, but if I can be of any service to you or them, without such a result, you may command me most fully, * * * * Very truly yours,

"————. M. D."

It being important to know the condition of and to have some surveillance of the above-mentioned person and her family, the Secretary subsequently learned of her death, and on Aug. 7, 1894, wrote the following letter to the physician previously corresponded with:—

"*Lansing, Aug. 7, 1894.*

"DR. ————:

"DEAR DOCTOR:—A few years ago you were kind enough to reply to questions relative to a case of alleged leprosy which was probably lupus. The patient was Mrs. ———. I understand that Mrs. —— —— is now dead. I would be glad to know whether any members of her family associated with her in her life time have since developed lupus, or any disease resembling leprosy.

"I would also like to know whether her son, who at one time manifested signs of tuberculosis, has recently had any appearance of that disease, or of lupus, or of any disease resembling leprosy. Have the two daughters remained healthy?

"Enclosed please find stamped envelope for your reply.

"Very respectfully,

"HENRY B. BAKER,

"*Secretary.*"

August 10, 1894, the following reply to the Secretary's letter of August 7, was received:—

"*Evart, Mich., August 8, 1894.*

"DR. HENRY B. BAKER, *Secretary, Lansing, Mich.:*

"DEAR DOCTOR:—Your favor of yesterday is at hand. In reply, am very glad to state that at present all three of the —— children are well, and have never, I am certain, developed any signs of lupus or sores or ulcers of any kind. The son, who is very tall and comparatively slim, has, although appearing delicate, had very good health for the past year or more—the apparent tendency to consumption has seemed to disappear; whether permanently or not remains to be seen.

"No cases of lupus or sores of any kind have, so far as I know, appeared in any of the other persons, who were in attendance on Mrs. —— during her sickness.

"Hoping this information, which is, I know, reliable (at least so far as the children are concerned) will be of service to you, I remain,

"Yours truly,

"————, M. D."

Alleged case of Leprosy in Clare, Clare county.

In November and December, 1891, a number of Michigan newspapers contained sensational articles, of considerable length, describing, in disgusting detail, and giving the name and residence of a case of alleged leprosy, living in the township of Sheridan, near the city of Clare. The Secretary of the State Board of Health investigated the subject, with the result, that, no such person as the one alleged to have the disease, lived in Clare, nor in the township mentioned near Clare, nor in Clare county, and there was no disease resembling leprosy in that locality; common colds were the only cause of sickness in the township in which it was alleged there was a case of leprosy. Just what newspaper started the false report was not learned. The State Republican, published at Lansing, Nov. 25, 1891, contained about half a column of details. The Grass Lake News of Nov. 28, 1891, contained an editorial paragraph, too scurrilous to be repeated here, in which it was said: "The State Board of Health are trying to cover up what is declared to be a case of genuine leprosy at Clare, in this State."

No case, or suspected case, of leprosy had been reported to the Secretary of the State Board of Health, and no health officer had been appointed or at least returned, for the township of Sheridan in which the alleged "John Powers" the "leper" was alleged to reside.

Nov. 27, 1891, the Secretary of this Board, wrote to Joshua Wilson, clerk of Sheridan township, Dover, Mich., as follows:—

"It is alleged that 'John Powers, a laboring man of Sheridan township,' is afflicted with leprosy.

"Will you have the kindness to make reports to this office relative to the case, giving as complete a history of it as is possible.

"As the name of the health officer of Sheridan township has not been received at this office, as provided by law, these reports are required from you under section 1629, Howell's Statutes, which requires that the township clerk shall 'make special reports whenever required to do so by the State Board of Health.'"

Dec. 8, 1891, the following official reply, to the above letter, was received from Mr. Wilson, clerk of the local board of health:—

"*To the Secretary of the State Board of Health:*

"In answer to yours, received the 5th, there is no such man in Sheridan township as John Powers, and I have made investigation and find that the report is false; and there is no disease in Sheridan township that I know of except colds or something of the sort."

A letter was sent to the health officer of the city of Clare, as follows:—

"*Lansing, December 9, 1891.*

"DR. M. D. DAVIS, *Health officer of the city, Clare, Mich.:*

"DEAR SIR:—Items have appeared recently in several newspapers alleging that a case of leprosy was present in the vicinity of Clare.

"The following is an extract from one of the articles:—'Dispatches from Clare, where the horrible disease of leprosy has been found in all the disgusting stages of the most malignant type, say there is only one case, that of John Powers, a laboring man of Sheridan township. * * * * Residents of Clare have severely censured the board of health, but without a proper knowledge of the case,' etc.

"Has such a case been reported to your board of health?

"Will you have the kindness to inform me by return mail, whether there is a case of leprosy in Clare or its vicinity?

"A stamped envelope is enclosed for your reply.

"Very respectfully,

"HENRY B. BAKER, *Secretary.*"

"P. S. The clerk of Sheridan says there is no such man as 'John Powers' in Sheridan, is there such a man in Clare? H. B. B."

Dec. 9, 1891, M. D. Davis, M. D., health officer of the city of Clare, wrote to the Secretary of this Board as follows:—

"In reply to your letter of enquiry in regard to leprosy in Sheridan township, of this county, I have to say that there is no such man as John Powers in Sheridan township or Clare county that I can find. I have made considerable enquiry among Sheridan people in regard to alleged case of leprosy. All that anybody appears to know is, that they saw something about it in the newspaper. Who started the report, or what it grew out of, I am unable to learn. I don't believe there is a case of leprosy in the State of Michigan. Very truly,

"M. D. DAVIS, M. D.,

"*Health Officer of the City of Clare.*"

So far as the office of the State Board of Health is informed there is no known or suspected case of leprosy in Michigan.

The law in Michigan requires that every case of "disease dangerous to the public health" shall be reported by the householder or physician to the health authorities. Leprosy is generally considered to be such a disease.

False Report of Leprosy in Houghton.

The Detroit "Tribune" of Dec. 10, 1891, contained the following item:—

"Houghton:—A 'washee' man in a local Chinese laundry is reported very ill with leprosy."

Dec. 11, 1891, the Secretary wrote to Dr. Jno. P. Mason, health officer of Houghton, regarding the above report, and on December 16 received the following answer:—

"*Houghton, Mich., Dec. 18, 1891.*

"HENRY B. BAKER, M. D., *Sec'y State Board of Health:*—

"DEAR DOCTOR:—Yours of the 11th at hand, and in reply would say that I have fully investigated the case referred to, and will say that there is nothing in it.

"It was all caused from a remark of the physician in attendance. He was called to the laundry for some slight ailment, and when he came out some one asked him what was the trouble, and he answered, in a joking way, leprosy; and that is what started the report. Yours truly,

"JOHN P. MASON."

On receipt of the above-quoted letter from Doctor Mason, the Secretary of this Board sent the following notice to the Press, in the hope that its publication would allay any alarm created by the false report of leprosy in Houghton:—

NO LEPROSY AT HOUGHTON.

Dr. John P. Mason, health officer, reports to the State Board of Health that he has fully investigated, and that there is no truth in the newspaper report that there was a case of leprosy at Houghton. The false report started in a joking or evasive reply by a physician to a question as to what ailed his patient at a laundry.

In April, 1892, the Secretary of the State Board of Health issued a hektograph circular of information for local health officers as follows:—

LEPROSY IN THE NORTHWESTERN STATES OF AMERICA.

There is not a case of leprosy known in the State of Michigan. Yet a leprous immigrant may arrive at any time, and occasionally there arises in the mind of a health officer the question—What should be done with a case of leprosy? There are now facts on record which seem to answer the question. In the London Lancet, for March 26, 1892, is an article by Chr. Gronvald, M. D., forwarded by Dr. Hewitt, Secretary of the State Board of Health of Minnesota, who says, "This Report by the Committee on Leprosy of the State Board of Health of Minnesota, came too late for presentation to the late Congress." (Referring to the International Congress of Hygiene.) "It relates in very conservative language the experience we have had for the last forty years with leprosy in Minnesota. * * * * The history of these cases has been very thoroughly studied. No further isolation than the use of their own beds and utensils is required, and this their own good sense and that of their relatives, as a rule, secures. It must be understood that the State Board of Health and the local boards have abundant power to enforce the strictest isolation, if found needful; but up to date there has not been any occasion for the use of such power, as the disease is limited to immigrants, and has never appeared in the descendants of lepers, nor in anyone born in the State. It is under constant and careful observation, and has been for the last eighteen years under the care of the State Board of Health. The facts officially stated will interest the students of a disease about which a good deal more has been written than is actually known."

Dr. Gronvald quotes from the results of an investigation made by Dr. Hansen, of Bergen, Norway, who came to America in 1888 to investigate the subject, as follows:—

"I cannot here relate all my observations in detail. I will only tell what I have found in regard to the occurrence, or rather the disappearance, of lepra in America (N. W. States). Of about 160 lepers who have immigrated into the three States named (Wisconsin, Iowa, Minnesota), thirteen are alive, whom I have seen myself, and perhaps three or four more. All the others are dead. Of all the descendants of lepers (and that includes the great-grand-children of some of them), not a single one has become leprous. This is, in short, the result of my investigation."

Dr. Gronvald says that at the date of his writing, July 20, 1891, there are eighteen lepers in Minnesota. "1. In no children or descendants born in Minnesota of lepers (there are great-grand-children), has there been any sign of the disease discovered, although under frequent observation. 2. Up to date no leper has been born in Minnesota." As he says, these facts suggest that leprosy is not easily acquired in this country. The facts seem to prove that "the use of their own beds and utensils" without further attempt at isolation, has been sufficient to restrict leprosy in the only States in the neighborhood of the great lakes in which it has been introduced. Without further effort at restriction, the facts show that the chances are over one hundred to one that leprosy will not spread here, even to the children of a leper.

Lansing, Mich., April 6, 1892.

HENRY B. BAKER.

HYDROPHOBIA (RABIES) IN MICHIGAN, IN 1891.

During the year, ending Dec. 31, 1891, there were reported to the Secretary of the State Board of Health three outbreaks of this disease, in the following-named localities in Michigan: New Haven township, Shiawassee county; Saginaw city and Cassopolis village, Cass county.

Details relative to these outbreaks of rabies and hydrophobia are given below:

Rabies in New Haven Township.

In the month of May, 1891, G. E. Hurd, health officer of New Haven township, reported to this Office, relative to an outbreak of this disease in his jurisdiction, substantially as follows:

"Several weeks ago a dog belonging to Mr. John Gallagher, living about four miles north of Corunna, was sick, bit Mr. Murphy's dog and ran away. At Gallagher's residence a goose was sick, bit Mrs. Gallagher so as to draw blood. The goose died. Murphy's dog bit two hogs and a cow. The dog was shut up and died, as did also the two hogs. The cow was sick and pronounced to have rabies. The cow died.

"Near this neighborhood, a calf is reported to have rabies. It bit Mrs. George Gotwalt, and in some way inoculated Herman Young. The calf is dead."

The fact that all the animals bitten die, is evidence that the disease is rabies, and that the persons bitten or otherwise inoculated will be likely to have hydrophobia. The Secretary of the State Board of Health advised that the women bitten have the Pasteur treatment, and she started for the New York Pasteur Institute.

Later the following paragraph appeared in "The Morning Patroit," published in Jackson, May 19, 1891:

"Dr. Gibier Treating a Woman Who was Bitten by a Goose.

"NEW YORK, May 18.—Dr. Paul Gibier of the Pasteur Institute is treating a woman from Corunna, Mich., who has a badly lacerated finger. Her husband, a well-to-do farmer, owned a large dog, which about three months ago was bitten by a strolling mongrel which was undoubtedly rabid, and in turn inserted his teeth into the flesh of a goose, a pig and several cows. The pig and cows died of hydrophobia as ascertained by a veterinary surgeon after an analysis of their brains. The goose soon evinced signs of sickness and refused to eat. The woman did not know the goose had been bitten, and thinking that something had stuck in the goose's throat inserted her finger to remove the obstacle when the goose closed its bill upon her finger. She arrived Thursday and went to the institute, where she received three inoculations. This will be repeated for several days."

Hydrophobia in Saginaw City.

The following paragraphs appeared in the Detroit newspapers:—

Detroit Evening Journal, Aug. 1, 1891:—

"Morey Godfrey, of Saginaw, Will Die of Hydrophobia.

"SAGINAW, MICH., July 31.—While Morey Godfrey was on his way home July 4, he was attacked by a strange dog. The brute knocked him down and bit him in several places, inflicting severe and horrible wounds. Godfrey had his wounds dressed by a local physician and the next day went about his work. A few days ago he complained of feeling unwell and remained home from work. Yesterday he went into a spasm at the sight of water, and has since that time gone from one convulsion to another, his frenzied exertions to get away from his attendants at times requiring the united strength of three or four men to hold him.

"He looks and snarls like a dog and tries to grab his attendants with his teeth. He begs his attendants to kill him. The doctors say it is a well developed case of hydrophobia and there is not one chance in a thousand of saving his life. He is about 17 years old and a remarkably strong boy for his age, rendering the work of attending to him one of great labor."

Detroit Journal, Aug. 1, 1891:—

"*Saginaw's Hydrophobia Case Ended Fatally this Morning.*

"SAGINAW, MICH., Aug. 1.—Morris Godfrey, the young man bitten by a dog July 4, who was taken with hydrophobia, died this morning, after suffering horribly. It was evident that the end could not be far off, as he was wearing himself out with his superhuman exertions and could not be forced to take any nourishment. Just before night he lost all consciousness and lay panting and snarling on the bed, every few minutes writhing and twisting in his terrible convulsions, and nearly overpowering his attendants.

"His anxious family gathered around the bed hoping against hope that he might be saved, but the doctors could not help him. After each convulsion he showed great distress for air although all the windows in the room were open and a stiff breeze blowing across the bed. Shortly after daybreak this morning his struggles grew less violent, and at 10 o'clock he breathed his last."

Detroit News, Aug. 27, 1891:

"*Another Added to Saginaw's List of Hydrophobic Cases.*

"SAGINAW, Mich., Aug. 26.—A bay mare belonging to H. Schultz was taken to Dr. Sternes' stables, suffering from hydrophobia. No one dared to go near her, she being terribly violent. Frothing and fuming, she died this morning. It is pronounced a case of active hydrophobia.

"A boy, a horse, a cow and a dog have died of the disease, in this city, during the last few weeks."

As soon as the above-quoted paragraphs came to the knowledge of this Office, a letter of inquiry, relative to the therein alleged cases of hydrophobia and rabies, was sent to Dr. N. D. Lee, health officer of Saginaw city, to which the following reply was received:

"In relation to that boy Marris Godfrey, that is reported to have died lately of hydrophobia, I would say that the case was not reported to me until after the boy was dead. Dr. S. I. Small, a first-class physician of this side, was called and had charge of the case. He generally reports to this office very promptly. Dr. Wm. S. Connery of the east side, assisted Dr. Small. It seems that the doctors were very reticent about the case, and the police, one of them was my assistant, kept as quiet as the doctors. They got everything safely quarantined immediately for these two doctors to treat and investigate and experiment upon. I believe the doctors did not come to a definite conclusion that it was hydrophobia until the day before he died. Dr. Small informed me that the minutes in the case were kept and will be published soon in the Medical Record of New York. * * * About the cow and horse having hydrophobia, I know nothing except what I saw in the papers. The cow and horse cases were not in my health district. They belong to the east side. If I can learn anything further, worth reporting about this case, I will do so."

Rabies in the Village of Cassopolis.

The "Detroit News" of Aug. 24, 1891, contained the following paragraph:

"CASSOPOLIS, Mich., Aug. 22.—Considerable excitement was occasioned in this village this morning by a mad dog running through the streets. It bit about a dozen other dogs and two persons before it was killed, after a lively chase, by the officers and others. P. F. Stettiner, groceryman, and a small boy by the name of Rose were quite badly bitten on the leg, and the rabid animal grabbed Mr. J. Boyd Thomas, but only tore his pants.

"Some of the dogs bitten have been killed, and the village board held a meeting and authorized the marshal to kill all dogs found unmuzzled on the street. The persons bitten will leave at once for Chicago to be treated by the Pasteur system of treatment."

Dr. James S. Stapleton, health officer of the village of Cassopolis, in response to a request from this office for information relative to the above-quoted report, wrote Aug. 31, 1891, confirming said report in every particular.

GLANDERS, AFFECTING MAN AND ANIMALS, IN MICHIGAN IN 1891.

During the year ending Dec. 31, 1891, there were reported to the Secretary of the State Board of Health eight outbreaks of glanders in seven localities in Michigan. The numbers of cases and deaths which resulted from several of these outbreaks were not definitely stated in the reports.

The localities from which the disease was reported present during the year were: Home township, Montcalm county; Alpena city; Pentwater village, Oceana county; Brant township, Saginaw county; Larkin township, Midland county; Caro, Indian Fields township, Tuscola county; Eureka township, Montcalm county.

The following extracts from communications received at, and sent from, this Office, give details relative to the above-mentioned outbreaks of glanders, and the action taken by this Office in regard thereto:—

Glanders in Home Township, Montcalm County.

The following letter, dated Feb. 2, 1891, was received from Alton F. Otis, health officer of McBride village, Montcalm county:—

"I have been informed that there is a case of glanders, or gleet, in Home township. I have written health officer of that township. I also inform you, as it may be of more use in executing the law."

A copy of Mr. Otis' letter was sent from this Office to Hon. H. H. Hinds, President of the State Live Stock Commission, Stanton, Michigan.

Glanders (Among Horses) in the City of Alpena.

February 2, 1891, Jas. Ritchie, V. S., wrote to this Office, from Alpena, as follows:—

"There is a case here, in a horse, which I diagnose to glanders. Please inform the State Veterinarian as I do not know his address, and oblige."

On receipt of Mr. Ritchie's letter, copies of it were immediately sent from this Office to Hon. H. H. Hinds, President State Live Stock Commission, and to Prof. E. A. A. Grange, State Veterinarian.

March 2, 1891, J. D. Dunlop, health officer of the city of Alpena, wrote as follows to this Office relative to the same outbreak of glanders:—

"Glanders has been reported to our board, I believe several times, by Mr. Ritchie, V. S. I was laid up myself so the matter has, I think, not been attended to. Now I don't know who to write to; but the matter wants looking after *immediately*, as there are several cases near here. I wish you would please forward this to the proper authorities, so that immediate action may be taken. You probably know where to send it."

In compliance with Dr. Dunlop's request, copy of his letter was sent from this Office to Hon. H. H. Hinds.

Later in the year the following paragraphs appeared in the papers:—

In the Detroit "Evening News" of November 19:—

"Glanders has made its appearance among Alpena county horses, and the board of health for the city has secured the services of a veterinary surgeon to look after diseased horses and kill them, if necessary."

In the Alpena "Pioneer" of November 20:—

"The board of health is making every effort to stamp out that terrible horse disease, glanders. At the meeting of the Council on Monday the Board was authorized to have a veterinary surgeon inspect all livery, hotel and other large barns in the city, and Dr. Ritchie has been engaged for the work. Thus far one horse in this city and two in Wilson have been killed by order of the State Veterinary Surgeon, and there are now four horses being held in quarantine until that officer can examine them. Any person knowing of a suspicious case should report it at once to the health officer of his ward or township or to City Physician Zeigenfuss. Alderman Pack is doing good work assisting the health officers to stamp out the disease."

Nov. 21, 1891, the Secretary of this Board wrote to Dr. W. E. Ziegenfuss, who was at that date health officer of the city of Alpena, calling his attention to the above-quoted paragraphs, and asking him to what extent the disease was prevailing in the city, and what precautions were being taken to prevent persons from contracting the disease.

The following reply, dated Nov. 21, 1891, was received from Dr. Ziegenfuss:

"Yours of the 21st at hand. Yes, glanders has made its appearance here, and so far there have been some three or four horses killed by order of the State Veternary surgeon, and several who did not wait for him, but killed their own horses on the opinion of our Vet. Surgeon, that the disease was glanders.

"I do not know to what extent the disease is present here; but I went before the council last Monday night (16th) for authority to engage veterinary surgeon to examine horses. This was necessary because city charter only allows Board of Health the expenditure of twenty (20) dollars on any one object and time. The power was given us, and we, on Tuesday night, engaged Dr. Ritchie to examine all public horses, such as dray, bus, delivery and livery horses, lumber barns, boarding stables and hotel stables, the last at such times as the largest number of country horses are there (Saturday).

"The township of Wilson, this county, has taken hold of the matter also, and promises thorough work.

"Will report more fully later on.

"Any suggestions on this subject gladly received."

Glanders (suspected) among Horses in the Village of Pentwater.

The following letter, dated June 5, 1891, was received at this Office from G. O. Switzer, M. D., health officer of the village of Pentwater, Oceana county:

"There are in this village a couple of horses that are supposed to have glanders. They have been worked together and have been kept in a stable where a horse was sick and died, of what was said to have been glanders, a couple of years ago.

"Knowing that glanders is a disease dangerous to man as well as horses, I write to you for information in regard to my duties as health officer in such cases."

On receipt of Dr. Switzer's letter, a copy of it was sent to the President of the State Live Stock Commission. At the same time the Secretary of this Board suggested to Hon. H. H. Hinds, that it was desirable that the State Live Stock Commission determine whether or not these cases are glanders.

Replying to Dr. Switzer's letter, the Secretary wrote, June 8, 1891, informing him of the action taken relative to the cases of glanders in Pentwater, and at the same time stating that "In accordance with Act 125, Laws of 1889, the local board of health should take charge of the cases until relieved by the State Live Stock Commission."

Glanders (in a horse) in Brant Township, Saginaw County.

June 6, 1891, Waldon De Clarenze, health officer, and H. Winter, clerk of Brant township, Saginaw county, wrote, jointly, to the Secretary of this Board as follows:—

"It has been reported to us that there is a case of glanders at S. B. Robinson's farm, Sec. 3, in this township (one of his horses). Please instruct us in regard to how to know whether it is glanders or not, as we are not farriers and notify Commission if necessary, as I do not know where to address letter."

Copy of this letter was sent to the President of the State Live Stock Commission.

Glanders in man and horses in Larkin Township, Midland County.

September 10, 1891, the following paragraph appeared in the "Midland Sun":

"The last of March W. E. Hewitt of Larkin died from having come in contact with a horse supposed to have had the glanders. The horse was afterward brought to Dr. W. A. Mann for treatment. The doctor suspected glanders and reported the case to Supervisor Howe, and at his request last Tuesday examined twenty horses and found three or four suspicious looking ones which he ordered quarantined. In the meantime the State Commissioner had been sent for and looked into the matter Wednesday, and the following Saturday the State Veterinary Surgeon, E. A. A. Grange, examined those quarantined and ordered one destroyed."

As soon as the above-quoted paragraph came to the notice of the Secretary of this Board, the letter of inquiry usual in such cases, was sent to the health officer of Larkin township, who, September 16, 1891, responded as follows:

"Your note of September 12th instant, is at hand, asking for information in regard to the article which appeared in the "Midland Sun" of Sept. 10, concerning the death of W. E. Hewitt, who was supposed to have died from glanders.

"In answer to your inquiries, will say W. E. Hewitt was a brother-in-law of mine and lived about one mile from me. He was a very strong and healthy man about 40 years old. About the middle of February last he traded horses in Midland city—an old one for a younger one, and said the one he got had the gleet. He kept it about a month and traded it off again. He kept it in the barn or log stable with his other two horses and two colts. About that time, while working in the barn one day he scratched his nose, just a little bit on one side of it, on a nail in the wall. This was about the 18th of March. On the 21st, the scratch on his nose began to be very painful. His wife and mother poulticed it that night and the next day, and it felt a little better. The third day he went to Midland to see a doctor about it. They told him he had only caught cold in it; but that he had seen the worst of it. He came back home and it began to grow worse and kept right on till he died. The fourth day they sent after a new doctor and the fifth day they telegraphed to Saginaw for Doctor Bliss. It kept spreading all over his face and forehead until it was one solid mass of putrid flesh from his mouth to the top of his head. They telegraphed for his folks to Clio, Genesee county. When his father came I heard him say to his father, 'I guess I got inoculated from that old horse that I had.' He never saw anything after the fifth day. His eyes were swollen shut and running very badly. Before he died, which was on the tenth day after he was taken sick, he also told his wife to burn up that old barn after he died; but it is not burned yet.

"I had the State Veterinarian come and see those horses that had been exposed, and those that he condemned have been killed and buried."

September 18, 1891, the Secretary of this Board wrote to E. A. A. Grange, State Veterinarian, as follows:

"Will you have the kindness to inform me whether you recently (since March 21, 1891) condemned any horses as sick with glanders, or farcy, on the farm of W. E. Hewitt, in the township of Larkin, Midland county? Phineas Howe is the health officer.

"Any information which you can give me relative to the occurrence of the disease in that locality, will be thankfully received.

"I wish particularly to learn whether or not W. E. Hewitt died of glanders, or whether it was erysipelas, or some other disease. He died about March 21, 1891."

In reply to the above letter, Prof. Grange wrote to the Secretary Sept. 19, 1891:

"In reply to yours of recent date, I beg to say that I condemned a horse belonging to Samuel Murdock on the 4th of this month, and in my opinion it was affected with glanders. The farm upon which this horse was, is in the township of Larkin, Midland county, and is I think the same one that you refer to, tho' the name Hewitt does not appear in my transactions. I dare say more light could be thrown upon the subject if we talked it over; so I will call in as soon as I can."

Prof. E. A. A. Grange, State Veterinarian, called at the office of the Secretary of this Board, and in conversation about the glanders in Larkin township, Midland county, in 1891, said that, as he understood the facts they were as follows: W. E. Hewitt traded an old horse for a young one, in February, 1891, at Midland. The young horse was sick but Mr. Hewitt thought that he would be able to cure the disease. That horse probably had glanders. Soon after the horse was taken to the barn of Mr. Hewitt, the owner had a little sore come on his nose; it rapidly grew worse and the inflammation spread over his face, and, within ten days, Mr. Hewitt was dead. Before his death, Mr. Hewitt became convinced that he had glanders, and requested that the horse from which he contracted the disease, be destroyed. The horse was not promptly destroyed, but was traded off, by Mr. Murdock, who married the widow of Mr. Hewitt, so it was owned by other parties before its death. Two other horses contracted the disease. The first two were dead, before the State Veterinarian arrived, but the third one was still alive and was condemned, as having glanders, by the State Veterinarian, and was, soon afterwards, killed.

Prof. Grange said that, from the accounts he received from the undertaker and others, he thought that Mr. Hewitt probably had glanders, and contracted it from the same horse from which the horse Prof. Grange examined probably contracted the disease. He said that the description of the rapid progress of the disease, and of the appearance of the patient, were consistent with the belief that he probably had glanders; but he had not seen the patient, and, if he had, it might, in this instance, have been difficult to distinguish between glanders and erysipelas.

Glanders (among horses) in Caro, Indian Fields township, Tuscola county.

September 18, 1891, John T. Kane, health officer of Indian Fields township, wrote to this Office as follows:

"I am holding two horses said to have glanders. Will you please send request, or this letter, to the Office of Cattle Commission and have the State Veterinary sent here to see them? Our Veterinary here does not call it glanders; but he is honest enough to say he does not know what the disease is. If there can be anything done about it, have it done now. If not, be kind enough to write me and I will let them go it."

Sept. 19, 1891, copy of Mr. Kane's letter was sent from this Office to President H. H. Hinds of the State Live Stock Commission, and on the same date the following letter was addressed to Mr. Kane by the Secretary of this Board:

"I have sent a full copy of your letter to Hon. H. H. Hinds, President of the State Live Stock Commission, Stanton, Michigan. If the investigations of your board 'show a reasonable probability' that the horses have glanders, or are 'affected with a contagious or infectious disease of a malignant character,' your local board of health should establish and *maintain* quarantine, and take such other measures as may be necessary to prevent the spread of the disease, until relieved by the State Live Stock Commission, (Act 125, Laws of 1889).

"I shall be glad to be informed just what measures are taken to prevent the further spread of the disease, and the result of such measures, for which I herewith enclose stamped envelope."

Sept. 26, 1891, Hon. H. H. Hinds wrote to the Secretary of this Board as follows:

"On receipt of yours of the 19th, conveying copy of letter of John T. Kane, health officer, at Caro, reporting cases of glanders at Caro, I directed the State Veterinarian to investigate same in its order, it standing behind a trip to Rogers City, which point is quite inaccessible, and takes time to reach. I expect that officer will reach Caro this morning. Mr. Kane was duly advised of this action."

Glanders (one horse) in Eureka township, Montcalm county.

Dec. 18, 1891, W. A. McLean, V. S., wrote to this Office, from Greenville, as follows:

"I have today discovered a case of glanders in a horse owned by Mr. Geo. Main, north and west of this city. Kindly inform me what to do in the case."

Copy of Mr. McLean's letter was sent to the President of the State Live Stock Commission; and in reply to Mr. McLean the Secretary of this Board wrote to that gentleman, Dec. 18, 1891, as follows:

"You should report the case to the health officer of the locality in which it exists, who should take charge of it until relieved by the State Live Stock Commission.

"Herewith I enclose you a copy of our 'Work of Health Officers and of Local Boards of Health' in which I have marked the part bearing upon glanders."

TYROTOXICON POISONING IN MICHIGAN IN 1891.

During the year ending December 31, 1891, information relative to three instances of probable tyrotoxicon poisoning was received at this Office, in which 16 cases of sickness from this cause were reported to have occurred, as follows: Banfield, Barry county, 7; Bay City, Bay county, 7; West Bay City, Bay county, 2.

The alleged poisoning of four persons by "bad cheese" at Grand Rapids, about Sept. 19, 1891, proved to have been from some other cause.

Probable Tyrotoxicon Poisoning in Banfield.

The following article appeared in the Hastings "Banner," April 23, 1891:

"*Banfield.*

"Last week Dr. Chandler's family and Ed. Troy's family were poisoned by eating cheese and all were very sick until an antidote was given them. The youngest child of Mr. Troy was thought to be dying by the whole family all night, but by injecting medicine into the flesh and stomach, she was finally brought to and is slowly recovering. All the rest are out of danger."

This paragraph having come to the notice of the Secretary of this Board, he wrote to Dr. J. J. Chandler, who is health officer of Johnston township, Barry Co., on April 28, 1891, as follows:

"The Hastings Banner of April 22, says your family and Mr. Ed. Troy's family were poisoned by eating cheese. I should like very much to have the cheese analyzed. If practicable, will you have the kindness to send me as large a piece as you can send?

"By this mail, I send you some pamphlets giving you a history of some occurrences of this sort."

In reply to the above letter, Dr. Chandler wrote on April 30, as follows:

"We are sorry we cannot comply with your request to send you some of the poisoned cheese. Dr. Vaughan sent for it. We expressed it to him April 25.

"Six persons ate of the cheese at 6 P. M., were taken sick at 10 P. M., with nausea, vomiting and watery stools. There was no complaint of pain in the stomach except in one person, and he had excessive nausea but no vomiting.

"The day following a child three years old ate of the cheese sometime during the forenoon and was taken with severe vomiting, rapidly passing into a stupor, laying unconscious from 12:30 until 3 P. M. Breathing was laborious; pulse faint; cold hands and feet."

Tyrotoxicon Poisoning in Bay City.

The Detroit "Evening News," of May 25, 1891, contained an item, saying that, 6 persons living in Bay City, had been poisoned by eating cheese. The Secretary of the State Board of Health wrote to the health officer of Bay City, on May 29, 1891, relative to the above report, as follows:—

"JOHN L. ELLIOTT, M. D., *Health Officer of City, Bay City, Mich.:*

"DEAR DOCTOR:—The following local item appeared in the Detroit 'Evening News,' May 25, 1891:—

"'Mrs. M. Beaudin and five children, of Bay City, ate cheese with tyrotoxicon in it, and came very near dying.'

"I should be glad to know,—if this was really a case of tyrotoxicon poisoning, how they know that it was tyrotoxicon poisoning, and if the cheese was examined? I should be glad to get a piece of this cheese for examination. Enclosed is stamped envelope for your reply. Will you kindly give me what information you can?"

June 3, 1891, the following reply was received from Dr. Elliott:—

"In reply to yours of the 29th prox. regarding some recent cases of probable tyrotoxicon poisoning in this city, I would state as follows:

"1. In the Beaudin family are seven members, six of them ate the cheese, and all were taken sick, while Mr. B. who ate no cheese was not affected.

"2. The cheese was apparently so nice that a piece was sent to a friend (a clerk in a store) with a lunch, and the friend was also taken sick after eating the cheese.

"These circumstances made it appear to the attending physician like tyrotoxicon poisoning. He procured a sample of the cheese and sent it to Dr. V. C. Vaughan for analysis. As yet no report has been received from the latter.*

"Of course the sale of the cheese was stopped at once. Whether a sample can be obtained now or not I do not know. The physician who had charge of these cases has promised to secure some for you if any can be procured. He thought, however, it had all been destroyed."

Tyrotoxicon Poisoning in West Bay City.

The Detroit "Free Press" of May 30, 1891, contained a paragraph, stating that two persons, living in West Bay City, had been poisoned by eating cheese. This article having come to the notice of the Secretary of the State Board of Health, he wrote, June 3, 1891, to the health officer of West Bay City for information, as follows:—

"The Detroit 'Free Press' of May 30, contained the following item:—

"'West Bay City, May 29.—Allen Prato and wife, of the sixth ward, ate cheese late last evening, and early this morning called Dr. Hagadorn to attend them. Mrs. Prato was found to be in a serious condition, vomiting blood quite often. It is thought the cheese contained tyrotoxicon.'

"If practicable will you kindly send me a sample of the cheese which was supposed to have caused the sickness?

"Was the cheese the same as that which caused the sickness in the Beaudin family of Bay City a few days ago? Where was it purchased?

"I will be glad to learn all the facts concerning this subject that you may be able to give me.

"Enclosed find stamped envelope for your reply."

The following answer was received on June 9, 1891:—

"*West Bay City, June 5, 1891.*

"HENRY B. BAKER, *Secretary State Board of Health, Lansing, Mich.:*

"DEAR DOCTOR:—Your letter addressed to 'Health Officer' has been handed me with request that I reply.

"The cheese eaten by Mr. and Mrs. Prato was sold them by Revilo Chase, a groceryman doing business on Chilson Ave. in this city, and manufactured by Dewitt & Shaver of Millington, Mich. It is of the same lot as that eaten by the Beaudin family, of Bay City.

"Several other families of West Bay city ate of the same cheese and nearly all were taken with vomiting and purging. Mr. Prato's case was not so serious, but Mrs. Prato vomited blood, and also passed a small quantity, of a dysenteric appearance.

"It was some five or six days before she ceased vomiting or retained any nourishment. She had severe griping pains in the intestines and great borborygmus. I send by post, a sample of the cheese and shall be pleased to be informed as to the analytical report of the same.

"Any further service that I can render you in this matter, will be a pleasure, and full of interest.

"Yours very truly,

"A. F. HAGADORN, M. D.,

"211 North Henry St."

*The result is stated in the last paragraph of this article.

June 9, 1891, the Secretary wrote to Dr. Hagadorn, as follows:—

"Please accept my cordial thanks for your letter of June 5, in reply to my letter of inquiry, to the health officer, concerning the cases of cheese poisoning in West Bay City; also for the sample of cheese.

"I have forwarded the sample of cheese to the State Laboratory of Hygiene for examination for tyrotoxicon, and I will inform you of the result of the test. But testing for tyrotoxicon is a complex and difficult process, and I fear that the quantity of cheese which you sent may be too small for obtaining satisfactory results."

The Secretary received a postal card from Dr. Hagadorn, on June 12, 1891, saying:—

"The name of the firm who manufactured the cheese, supposed to contain 'tyrotoxicon' is, Dewitt & Shaver, their address is Millington, Mich."

The Secretary wrote to Dewitt & Shaver, on June 15, 1891, as follows:—

"DEWITT & SHAVER, *Cheese Manufacturers, Millington, Mich.:*

"DEAR SIRS:—I am informed that the cheese which caused recent cases of sickness in the Prato, Beaudin and other families in Bay City, was obtained of R. Chase, groceryman, who obtained the cheese from you.

"The poison which is supposed to have caused the sickness is believed to be *tyrotoxicon*, and specimens of the cheese are now being tested for that substance at the State Laboratory of Hygiene.

"Any facts which you may be able to give me concerning this cheese will be gladly received.

"I herewith enclose a copy of a paper on 'Poisonous Cheese,' by Prof. V. C. Vaughan, member of this Board, which may be of interest to you.

"Enclosed find stamped envelope for your reply.

"P. S. Will it be practicable to obtain a larger sample of the cheese for more complete investigation? Will you give me any facts concerning the making of that cheese, that may have a bearing upon this subject?"

June 18, the following reply was received from Dewitt & Shaver:—

"Yours of the 15th inst. received; would say in regard to the cheese which you refer to, that we sold to Walsh & Edinborough, of West Bay City, the cheeses were made the second day of May, and sold at 15 days old. We made five that day, one of which was cut, by one of our merchants here and he heard no complaint.

"Walsh & Edinborough returned two on May 26, with a statement that they made people sick. After the cheeses were returned they were examined by us and the cheese maker, who cut some of it, and ate it, and it did not affect him. The same day a man came to the factory and wanted a piece of cheese, we told him we had some that had been returned for the cause stated; he tried it, and we sold him 3½ pounds and it did not affect him. The next day my son-in-law came into the factory, and took some home with him, and said it was all right, the balance we sold to our patrons, and no one complained of it making them sick.

"Our facilities for manufacturing cheese are the same as appears in the pamphlet you sent us, on page 223. If you can inform us as to the cause it will be thankfully received. We are,

"Yours truly,

"DEWITT & SHAVER."

Alleged Cheese Poisoning in Grand Rapids.

The Saginaw "Evening News" of Sept. 19, 1891, contained the following paragraph:—

"Mrs. J. A. Ford and her three children, of Grand Rapids, were poisoned by eating bad cheese Friday. All have recovered, however, except the youngest boy who now lies in a dangerous condition."

September 23, 1891, the Secretary of this Board wrote to Wm. G. Saunders, M. D., health officer of the city of Grand Rapids. After quoting the above item from the "News," he continued as follows:—

"If convenient, will you kindly inform me if this report is true? If it is, I will be glad to receive a sample of the cheese, if you can procure it for me.

"I will be glad to receive any facts you may have bearing upon this subject."

Dr. Saunders answered on Sept. 24, 1891, as follows:—

"I have received your inquiry in relation to children eating poisoned cheese. An item appeared in one of our papers about the same date as in the Saginaw paper; by investigation, at the time, I learned there was no truth in the report.

"The children's sickness was not caused by eating the cheese."

Results of Chemical Examinations of Cheese.

Of the samples of cheese examined at the State Laboratory of Hygiene, Ann Arbor, Dr. Vaughan reported: "In regard to the samples of cheese examined here in the laboratory, I will say that all those examined in 1891 contained a poisonous proteid and not tyrotoxicon."

ALLEGED POISONING BY CANNED FRUIT IN MICHIGAN IN 1891.

In the year 1891, there was reported to the secretary of the State Board of Health, the poisoning of six persons, with one death, supposed to have been caused by eating canned currants. The persons lived in Mayfield township, Lapeer county.

Dr. F. A. Tinker of Lapeer city, who had charge of the cases, wrote to the Secretary, and sent a can of the suspected fruit for analysis; this was sent to the State Laboratory of Hygiene; the analytical report is given below. Dr. Tinker's report of the cases, is included in the Secretary's letter to Prof. Vaughan, which was as follows:

"*Lansing, Mich., June 5, 1891.*

"PROF. V. C. VAUGHAN, M. D.,
"Member of the State Board of Health,
"Ann Arbor, Michigan.

"DEAR DOCTOR:—The following letter is a copy of one just received:—

"'*Lapeer, June 4, 1891.*

"'HENRY B. BAKER, M. D., *Lansing, Michigan.*

"'DEAR SIR:—I send you by express today a can of currants, for chemical analysis. The facts of this case are briefly as follows. On May the 29th, 6 a. m., I was called to see a farmer's family consisting of eight adults, viz.: P. Ivory, aged 64, his wife, son and son's wife, one relative and three workmen, two children—one æt. 1 year, nursing, the other æt. 9 years. The father, wife and son, were suffering from violent vomiting, and purging, cramps, etc., as accompany arsenical or some other irritant poisoning. The old gentleman had severe spasms of the flexor muscles, which continued, although somewhat lessened, until his death, which occurred June 3.

"'Saturday night the three workmen were similarly attacked, but some what less severe than those first affected. All, excepting the old gentleman, will probably survive. We searched very thoroughly for the source of the trouble. The only thing that exites any suspicion is the can of currants which I send. All who ate of the currants were sick, while all who did not, were not affected. The currants were eaten for supper May 27, this can was the first that had been used since they were put up last fall.

"'They used Paris green on the currant bushes until the currants were half grown. Whether it was due to this, or to the action of the acid in the currants upon the metallic top of the can, or to some accidental or intentional introduction of the poison, we could not tell. You will observe that in this can, when the can is inverted, that the fluid comes in contact with the metal in the screw of the top.

"'The first three were taken sick about 14 to 18 hours after eating them, the last three were not affected until 72 hours after eating, which is rather long to be accounted for from eating the currants. The water they use is from a well, which they have used for years. Their cooking utensils are the same that they have used for a long time, and do not contain any copper. The only new articles of food brought into the house just before this, were sugar and salt pork, of these many relatives and friends have partaken, and are not affected, and besides these, they had been eating pie-plant for pies.

"'Their pupils were normal or perhaps slightly contracted.

"'Hope you will inform me of the result of the analysis as soon as possible.

"'Yours respectfully,

"'F. A. TINKER, M. D.'

"By the American Express I send you the can of currants, and if you think the public interests are sufficient to warrant this Board's paying for the analysis, will you have the kindness to make the examination, send the results to me, and bring in your bill at the next meeting of the Board?

"Very respectfully,

"HENRY B. BAKER, *Secretary.*"

June 5, 1891, the Secretary wrote to Dr. Tinker, as follows:—

"In response to your letter of June 4,—the can of currants was received, and I have sent it, together with a copy of your letter, to the Laboratory of Hygiene, at Ann Arbor, for analysis. I will let you know the result, as soon as I learn of it.

"Very respectfully,

"HENRY B. BAKER, *Secretary.*"

On July 11, 1891, Prof. Vaughan, director of the Laboratory of Hygiene, at the State University, reported relative to the can of currants supposed to have caused fatal poisonings at Lapeer, that "The currants were tested for inorganic and organic poisons, for ptomaines and bacterial proteids and for poisonous germs, all without effect. Aqueous extracts were injected into animals without effect."

At the meeting of the State Board of Health, in Lansing, July 14, 1891, Dr. Vaughan said, in addition to what is quoted above, from his report, that it was supposed some of the arsenic which was used on the bushes got into the currants and was canned, thus causing the poisoning: "It seems very evident that the poisoning must have come from some other food. I have been unable to find any poison, and I have done a great deal of work on the analyses, as I was anxious to find some poison. The dead bodies of the persons should have been examined."

But the State Board of Health has no appropriation sufficient for the purpose of entering upon such examinations.

POISONING BY LEAD PIPE IN MICHIGAN IN 1891.

In the year ending Dec. 31, 1891, there was reported to this Office one case of poisoning from the use of lead pipe in conducting the water used for drinking and culinary purposes. The poisoning occurred in the city of Kalamazoo, and was reported by Dr. C. Van Zwaluwenburg, health officer of the city. The correspondence relative to the above case of lead poisoning was as follows:—

"*Kalamazoo, Mich., July 27, 1891.*

"H. B. BAKER, M. D., *Sec. State Board of Health, Lansing, Mich.:*

"DEAR DOCTOR:—I find that considerable lead pipe is used by plumbers in this city for our Holly water used for drinking and culinary purposes. A case of poisoning occurred from it recently. I can find no regulations of the city in regard to the same. Would you advise an ordinance prohibiting its use? What is the position of Boards in other cities in regard to it?

"Thanks for answers already received, * * * * * * .

"Yours truly,

"C. VAN ZWALUWENBURG, M. D.,

"*Health Officer of Kalamazoo.*"

July 30, 1891, the Secretary of this Board answered the above letter as follows:—

"Replying to your letter of July 27,—the subject of lead pipe for conveying drinking water is a difficult one to deal with. Boards of *health* almost uniformly advise against it, while boards of *water* commissioners almost uniformly require it. One result usually is a very great waste of water, because all water that has stood long in a lead pipe should be allowed to run to waste before drawing for drinking and culinary purposes. I would advise you to ascertain what the rule of your board of water commissioners is; and I will be glad to know what their views are; also, how severe was the case of poisoning which occurred in Kalamazoo.

"Scattered through our library are several articles on lead poisoning, which could probably be found by a thorough search, if it is desirable."

SUSPECTED POISONING FROM COFFEE IN MICHIGAN IN 1891.

There was reported to the office of the State Board of Health, in the year 1891, the suspected poisoning of five persons, by the use of coffee. The family, consisting of father, mother and three children were all affected; the symptoms were severe in the cases of the two adults, but all recovered. The family resided in Bay City, Bay county.

The report was made by Dr. J. L. Elliott, health officer of Bay City, he also sent a history of the cases, taken by Dr. Hoyt, who attended them at the time of the poisoning. The correspondence relative to the above mentioned cases is given below.

The following letter was received by the Secretary and presented to the State Board of Health at its meeting held at Iron Mountain, Mich., Oct. 31, 1891.

Bay City, Mich., Oct. 26, 1891.

"DEAR DOCTOR:—I send you herewith the account of a case of poisoning which occurred in this city a few days ago. Dr. Hoyt has kindly written out an extensive report, at my request, and he has also given me the package of coffee from which the supposed poison was taken.

"It seems like a case of some importance and if a sample of the coffee is wanted by you for analysis, I shall be pleased to forward it to you.

"Yours very truly,

"J. L. ELLIOTT, *Health Officer*."

Enclosed in the above letter, was the following daily history of the cases, given by Dr. Hoyt:—

"At 11 P. M. of Oct. 18, I was called to attend the family of Wm. Thompson of Stanton St., Bay City, who gave the following history:— The family consists of Mr. Thompson æt. 41 years, his wife, a delicate, sickly woman, Willie æt. 11, Arthur æt. 9, and Katie æt. 8 years.

"All had been in usual good health, and had eaten a hearty dinner, etc. At 8:30 P. M., Mr. T. suggested that they have a cup of coffee before retiring and proceeded to prepare the same. The coffee was a new package of McLaughlin's XXXX, purchased and ground at a local grocery, and was boiled in a common iron kettle used for the purpose, and then poured into a white earthen pitcher.

"All drank freely of the coffee and ate crackers. The coffee and crackers were the only food taken. The crackers were some of the same they had used before and since with no bad results. Their well is a good crock or tile well and the water is used by several neighbors. The milk was night's milk purchased of a reputable milk dealer. Mrs. Christian, a neighbor, purchased milk from the same man on the same night, and used water from the same well for her family and noticed no ill effects.

"After all had drank quite freely, Arthur complained of a peculiar taste in the coffee, and soon began vomiting profusely. Mrs. Thompson, and the other children, began vomiting very freely soon after.

"Mr. Thompson was sick, but did not vomit for one and a half hours, when he too, began vomiting. I saw them at 11 P. M. All the children were feeling better and only vomiting occasionally and had less pain in the stomach, and the next morning were sufficiently recovered to attend school. I gave Mr. Thompson an emetic which acted promptly and efficiently.

"Mrs. Thompson was vomiting frequently, the acts of vomiting being repeated every 3-5 minutes; both complained of sharp pain in head and in the stomach, shooting through the bowels. They were considerably prostrated, temperature normal, pulse about 82, his being very full and strong.

"Mr. Thompson purged slightly, the others, not at all. They remained in this condition through the night; the next morning Mrs. T. felt much better, and thought she would soon recover, but could not sit up. Mr. T. was suffering agony in his stomach, head and bowels, but did not vomit; in the evening he was in less pain but was dull, stupid and drowsy. Mrs. Thompson was feeling worse, was again vomiting frequently, the vomited material having a light green color; her temperature was normal, pulse 64.

"Oct. 20, 9 A. M., Mr. Thompson feeling much better, the pain in the head, stomach and bowels nearly gone, but felt severe pain in the region of his kidneys. He was able to walk about.

"Mrs. Thompson was still vomiting, the vomited matter having the same light green color. Her expression was anxious, and the vomiting was preceded by deathly sickness; pulse normal in number but very feeble.

"I should have mentioned, that the coffee was made very strong, a large amount being used, and that, Mrs. T.'s stomach was quite empty, also, that she had several chills. In the afternoon of the 20th, Dr. Baird was there with me, the burning pain in her stomach and vomiting still continued, with dizziness, evidently suffering from acute gastritis, pulse feeble and accelerated.

"I prescribed morphia, bismuth, ice, etc., but she put in a bad night.

"Oct. 21, Mr. Thompson was able to resume work again. Mrs. T.'s condition was the same, save that the pain and soreness was better and the intervals between vomiting were a little longer. Refused to take more morphine.

"Oct. 22. No trace of copper or arsenic could be found in the coffee by a local druggist. Mrs. Thompson's condition much improved. The vomiting about controlled but still unable to leave her bed.

"Oct. 23, her condition was about the same, any attempt to take nourishment caused a return of the vomiting and pain; pulse feeble.

"Had chills during the day. At this time the case passed from my care.

"Respectfully submitted by

"E. A. HOYT, M. D."

The Secretary answered as follows:—

"*Lansing, Mich., October 27, 1891.*

"*J. L. Elliott, Health Officer of the city, Bay City, Michigan:*—

"DEAR DOCTOR—Please accept thanks for your letter of October 26, also for the report of Dr. Hoyt concerning the cases of poisoning. I will be glad to receive a sample of the suspected coffee.

"Very respectfully,

"HENRY B. BAKER, *Secretary.*"

At the meeting of the State Board of Health. at Iron Mountain, Mich., October 31, 1891, the Secretary submitted the communication he had received from Dr. Elliott and the statement of Dr. Hoyt, relative to the case of poisoning by coffee. After consideration of the subject, Dr. Vaughan said, that, if a sample of the coffee, which was supposed to have caused the poisoning, were sent to him he would have it analyzed, free of cost to the Board or to parties concerned at Bay City. Further action of the Board in regard to this matter was then postponed until after said analysis had been made.

On November 18, 1891, the Secretary inserted in a letter to Dr. Elliott the following request:—

"The coffee, which you referred to in your letter of October 26, has not been received. I shall be pleased to receive it, if convenient. Also, to know if the milk was positively excluded, as a cause of the sickness; because the symptoms resemble those of tyrotoxicon poisoning."

A sample of the coffee was received at this office Nov. 20, 1891, and forwarded to Dr. V. C. Vaughan for analysis. At the meeting of the Board in Lansing, April 12, 1892, Dr. Vaughan reported that, after having analyzed the coffee for poison, and finding none, he ate a good share of it himself, and it had no deleterious effect.

ALLEGED NUISANCES IN MICHIGAN IN 1891.

During the year 1891, communications relative to alleged nuisances, were received at the office of the State Board of Health, from twenty-three localities in Michigan.

The causes to which the alleged nuisances mentioned in these communications were attributed, may be classified as follows:

Canada thistles, 1; pigstyes, 1; foul cistern, 1; carcasses of dead animals, 2; filthy mill race, 1; dam on Platt river, 1; barn and refuse pile near residence, 1; stagnant ponds, 2; cow yard near dwelling, 1; wild rice in St. Joseph river, 1; refuse matter on residence property, 1; deodorization of contents of privy vaults, 1; dam at outlet of Long Lake, 1; dead fish on shores of Cranberry Lake, 1; foul closet and well, 1; child in school the odor from whose nose is offensive, 1; sawdust thrown into Grand River, 1; florist's compost heap, 1; open sewer, 1; abatement of nuisances in general, 1; slaughter-house offal thrown on ground, 1.

The following extracts from the correspondence of this office relative to the above-mentioned alleged nuisances, show the nature of those nuisances, and the action taken, and recommended to be taken, in regard to them.

CANADA THISTLES SPREAD BY DITCHING?

The following letter from Mrs. M. L. Spear, Pontiac, dated March 18, 1891, and addressed to the State Board of Agriculture, was referred to this Office by the Secretary of that Board:

"Please send to my address a treatise on the best method to exterminate Canada thistles. I own 160 acres of land in Sanilac Co., 6 miles north of Marlette that is becoming infested with them; as is also the surrounding country. Our health officer has allowed ditching done in that section, for health's sake, until many poor people are so worn out ditching or paying for it, that they cannot attend to the thistles. Ditching has cost me (a poor woman) already nearly $400, and the land did not need a foot of it. Now the Canada thistle is about running that country to ruin. Following the health officer's raid, they first dig and then widen and so manage to help the thistles flourish. * * * * * * *

"A few influential men own swamp land and are getting it drained for health's sake. An immense body of swamp lies to the north."

In reply to Mrs. Spear's letter, the secretary of this Board wrote to that lady March 23, 1891, as follows:

"The laws of Michigan relative to drainage contemplate that no drainage shall be enforced except for the benefit of the public health; yet no health officer is given any power whatever over the subject of the drainage of land. That subject is entirely out of the control of health officers. So I think you must be in error in the statement in your letter relative to drains, thistles, etc., forwarded to this Office by H. G. Reynolds, Secretary of the State Board of Agriculture. I do not suppose that any *health officer* had anything to do with any ditches of which you complain, in Sanilac county. If you have any *evidence* that they did, I shall be glad to be informed of the facts."

PIGSTIES ALLEGED NUISANCES.

The following letter, dated April 1, 1891, from J. B. Fares, M. D., health officer of the village of Romeo, was received at this office:

"In making my annual report for 1890, I recollect stating that this village is in greater danger from the nuisance of pigsties than any other, and I have been thinking it might almost appear ridiculous without further explanation. The facts are these: When I came to act as health officer, I found two places within the corporation where hogs were kept and the odor was so obnoxious that I was importuned to see after it. I at that time thought the village board had power to say to the keepers of swine 'You remove these pests without the corporation; but I soon found they could not do it, and these keepers were very slow to abate the nuisance, and the same trial with these individuals occurred last year. It seems to me that there ought to be special legislation in reference to this evil."

In response to Dr. Fares' letter the Secretary of this Board wrote April 2, 1891:—

"It is too late to introduce a bill in this legislative session; but I think your local board could regulate all such nuisances as pigsties, under existing laws. All that is necessary to do is to put sufficient study into the subject, and have the action start right, and be enforced continuously. I think it important that the local board shall *make* and *publish regulations*, in accordance with § 1636, Howell's Statutes, which I have marked on page 6 of our pamphlet, 'Work of Health Officers,' sent herewith. Such regulations should describe whether or not pig-pens will be permitted inside the corporation limits, and in what condition they shall be kept. Then, whoever violates those *published* regulations is subject to a fine 'not exceeding one hundred dollars.'

"In the report of this Board for the year 1875, pages xix-xxi, you will find proposed 'rules and regulations' on such subjects."

FOUL CISTERN.

J. C. McNeece, M. D., health officer of the village of Morley, wrote to this Office as follows:—

"There is a cistern in this village which should be cleaned out. I have told the parties to clean it out more than once, and they put it off. Now I cannot find any particular law to deal with such parties, especially when they are only tenants. The owner lives in another town. What can I do, or what will be the next step? That cistern has got to be cleaned."

May 5, 1891, the following reply to Dr. McNeece's letter was sent from this Office:—

"In reply to your letter of May 2, concerning a nuisance in the case of a cistern in your village,—it is not in the power of a health officer to abate a nuisance, except in executing the specific orders of the local board of health.

"I herewith enclose a copy of our pamphlet, 'Work of Health Officers,' on page 9 of which I have marked paragraphs bearing upon the subject of nuisances. I also enclose two other pamphlets bearing upon the subject of nuisances.

CARCASSES OF DEAD ANIMALS.

The following letter, dated May 18, 1891, was received at this office from A. F. Otis, health officer of the village of McBride, Montcalm county:—

"In our village a resident buried a dead horse in back part of his lot, not more than 15 feet from house. He has now removed from the village, but not out of the county. I intend bringing this before the board at once, for their disposal. Now if this horse is so decayed it cannot be moved (as it was buried only 8 or 10 inches below ground) what do you suggest as the best to do? Any information you may impart will be thankfully received. Please answer."

In reply to Mr. Otis' letter, the Secretary of this Board wrote to him May 19, 1891:—

"Replying to your letter of May 18, relative to a dead horse buried in the back yard of a residence,—I should think that, if it is *possible*, the animal ought to be removed out of the village, because, otherwise, its decomposing substance will leach through into the water-bearing stratum, from which the people of your village get their drinking-water. You do not say how long it has been buried. Possibly strong (saturated) solution of copperas, thrown over it might deaden the odor sufficiently so that it might be removed? If it is absolutely impossible to remove it, its odor could probably be kept down by making a mound of earth over it.

"We have recently sent you a copy of 'Public-Health Laws of Michigan,' in which you will find the laws relating to nuisances.

"There is a paragraph on this subject in pamphlet [120.] 'Work of Health Officers,' which I think has been sent you recently.

"Any further aid which I can give will be cheerfully given."

Dell Putnam, a resident of Vienna, Albert township, Montmorency county, wrote to this Board, June 21, 1891, as follows:

"The Board of Health here in Albert township, Montmorency county, are violating the law again. They are allowing dead horses to lay on the ground within 80 rods of Vienna, and diphtheria is raging here again. If you have any authority out there, please send some here. I notified the Board by mail and by person; but they pay no heed. Last spring I lost my wife and little girl and don't want to lose any more. I have taken two witnesses to look at horse on top of ground so they can't dodge it."

June 25, 1891, the Secretary replied to Mr. Putnam's letter as follows:

"In reply to your letter of June 21, relative to an alleged nuisance in Albert township, the body of a dead horse being allowed to remain on top of the ground within 80 rods of Vienna,—Section 1640, Howell's Statutes, *requires the local board of health* to examine into all nuisances, sources of filth, and causes of sickness that may, in their opinion, be injurious to the health of inhabitants, and destroy, remove, or prevent the same as the case may require.

"Section 7965, Howell's Statutes, gives the circuit court *equity* jurisdiction in all matters concerning nuisances where there is not a *plain, adequate* and *complete* remedy at law; and authorizes the court to grant injunctions to stay or prevent nuisances. If the court is not in session, application should be made to the circuit judges.

"If the local board of health refuses or neglects to make the proper complaint for the abatement of a nuisance injurious to health, any person injured or annoyed thereby may make complaint and prosecute a suit for the abatement of the nuisance as a public nuisance, or for damages by reason of the nuisance as a private nuisance and for the abatement of the same.

"By this mail I send you a copy of our pamphlet, 'Work of Health Officers and of Local Boards of Health in Michigan," and also two other pamphlet-publications of this Board bearing upon the subject of nuisances.

"If this Office can be of any further service to you in this case, it will give me pleasure. I will call the attention of the local board of health to this nuisance."

On the same date (June 25, 1891), the Secretary wrote, also, to Mr. Edward J. Putnam, Supervisor of Albert township, as follows:

"Complaint reaches this Office of an alleged nuisance in the township of Albert by 'allowing dead horse to lay on the ground within 80 rods of Vienna.'

"Section 1640, Howell's Statutes, requires the local board of health to examine into all nuisances, sources of filth, and causes of sickness that may, in their opinion, be injurious to the health of inhabitants, and destroy, remove, or prevent the same as the case may require.

"Section 7965, Howell's Statutes, gives the circuit court *equity* jurisdiction in all matters concerning nuisances where there is not a *plain, adequate* and *complete* remedy at law; and authorize the court to grant injunctions to stay or prevent nuisances. If the court is not in session, application should be made to the circuit judge.

"By this mail I send you our pamphlet, 'Work of Health Officers and of Local Boards of Health in Michigan,' and also two other pamphlet publications bearing upon the subject of nuisances.

"I will be glad to be informed that the nuisance is abated."

FILTHY MILL RACE, AND SLAUGHTER-HOUSE OFFAL, ALLEGED NUISANCES.

Mrs. J. N. Colby, a resident of the city of Ypsilanti, wrote to this Office June 24, 1891, as follows:

"I wish to be informed regarding a nuisance in our midst. A person has put a dam across an old mill race, on Race street, that has not been used for 30 years. It is full of every sort of filth. He fills it partly with water and keeps it stagnant, and the smell is very offensive at times. We have applied to the board of health. They declare it a nuisance but will not act upon it. I applied to the Mayor, asked him why they would not abate the nuisance. He said because they were shiftless. It has caused all sorts of sickness and does yet. The people can not live by it. Will you please inform me if a petition will be noticed by you and how many signers will be required?

"Also a slaughter house in the same locality. They throw their offal out upon the ground for days. The stench is unbearable at times. The board of health fail to act in this matter as in the other."

In reply to Mrs. Colby's letter the Secretary of this Board wrote to that lady, June 25, 1891, explaining the laws relative to nuisances, and the necessary procedure to obtain their abatement; and sent her pamphlets published by this Board, containing full information relative to the subject of nuisances.

On the same date the Secretary wrote, also, to the president to the board of health of Ypsilanti, informing him of the complaints made by Mrs. Colby, calling his attention to sections 1640 and 7975 of Howell's Statutes, and sending him pamphlet publications of this Board bearing on the duties of health officers and local boards of health in regard to nuisances, and on the subject of nuisances generally.

DAM ON PLATT RIVER AN ALLEGED NUISANCE.

The following communication, relative to this alleged nuisance, was received at this Office:—

"*Almira, Benzie Co., Mich., May 24, 1891.*

"*To the Secretary of the State Board of Health, Lansing:*

DEAR SIR:—We desire to get your council in regard to a matter that is troubling us, a local board of health. A dam on Platt river has been declared a nuisance and source of filth, etc., by us; and acting on your advice, we passed a resolution making application to the circuit judge of this circuit for a mandamus to abate the alleged nuisance, and put the same into an attorney's hands to prosecute. It seems to be the opinion of both the judge and our attorney that we had better make the attempt as a local board to abate the nuisance, etc. Before resorting to that measure, acting under the attorney's instruction, we caused notice to be served on the party that seemed to be in charge of the dam, to raise the gate and let the water flow, within 24 hours, etc. No attention was paid to the same, the party on whom notice was served claiming he had nothing to do with the dam. We then went there as a board of health, accompanied by a constable, and on a warrant issued by myself, as a justice of the peace, proceeded to open the dam by raising the gate, and placed a notice signed by the board on the dam, forbidding *any* person or persons from again closing the gate or in any way to interfere with the natural flow of the water, under penalty of the law, etc. The gate was promptly closed again, and we are not able to ascertain by whom.

"Our attorney now informs us that he sees no other way but for us to go and destroy the dam so as to render it impossible to be again closed.

"Now what we want to know is, have we a right to proceed in the manner suggested? and without laying ourselves liable for damage? It should be borne in mind that none of the members of the board are physicians, and perhaps are not qualified, for that reason, to knowingly make the declaration in regard to the dam in question being a nuisance within the meaning and intentions of the statute; and again, we

have very little doubt if the question was submitted to a vote of the people of the town but that they by a large majority would be in favor of leaving the dam alone. Not but that the more intelligent ones may consider it a bad thing for the sanitary condition of the people; but for fear of the possible consequences of expense, etc.

"Please instruct us in regard to the matter, and oblige your obedient servants,

"LEON D. SPAFFORD, *Chairman*,
"C. S. LINKLETTER, *Justice of Peace*,
"J. J. GRAY, *Town Clerk*."

In reply to the last preceding letter, the Secretary of this Board wrote, May 28, 1891, as follows:—

"Where the order of the local board of health to abate a nuisance is not obeyed, it is the safer course to enter complaint before a court and secure a judicial order for its abatement. In all cases where there is not a *plain*, *adequate* and *complete* remedy at law the circuit court for the county (or the circuit judge sitting in chambers) has equity jurisdiction to grant injunctions to stay or prevent nuisances.—This law is §7965, Howell's Statutes.

"In my letter of August 14, 1888, to Leon D. Spafford, the above advice was given, and, as there has been no change in the law, I see no reason to change the advice.

"The circuit judge will probably find way to enforce his orders, if on investigation the alleged nuisance proves to be a real nuisance, in the opinion of the court.

"By this mail I send you copy of the public health laws, marked."

MANURE PILE NEAR RESIDENCE AN ALLEGED NUISANCE.

June 11, 1891, Mr. M. L. Baldwin, clerk of Grandville village, Kent county, wrote to this Office, as follows:—

"I herewith take the liberty to write you for information, as there is a barn very close to my house and the refuse pile is only 15 feet from my bedroom window, and it is sometimes unendurable. Now what I wish to know is if there is not some way to prevent the party who uses the barn from throwing out the refuse. The party will leave the refuse until there is a big load and then will have it removed. Some mornings when there is a heavy atmosphere we are obliged to close our house to keep the odor out. Our village board seem to think that I cannot make out that it is a nuisance. With an early reply you will greatly oblige."

In reply to Mr. Baldwin's letter the Secretary of this Board wrote to him, June 13, 1891, giving him the desired information and sending him pamphlet publications of this Board bearing on the subject of nuisances.

STAGNANT PONDS.

The following letter, dated June 15, 1891, and signed by Alex. Bevins; Samuel McKillen, health officer, of Goodland township; and H. Cheney, clerk of Imlay City village, Lapeer county, was received at this Office:—

"There is a pond of water that lies dead, and there is a very bad smell that arises from it, and the pond is very unhealthy as it is about ten rods from a house. There has been a petition, with fifteen signers taken to our drain commissioner, and he wont pay any notice to it; and now we call on the State Board of Health to do something with it, as the town will not. It lies between sections 31 and 32 of the town of Goodland, Lapeer county."

Under date June 17, 1891, the Secretary of this Board replied to the above-quoted letter as follows:—

"From your statement I conclude that the case you mention is one 'where there is not a *plain*, *adequate* and *complete* remedy at law,' and in such cases section 7965 Howell's Statutes, gives the circuit court *equity* jurisdiction, and authorizes the court to grant injunctions to stay or prevent nuisances. When the court is not in session, application should be made to the circuit judge."

Sept. 21, 1891, James Chatfield, health officer of Duncan township, Houghton county, wrote to the Secretary of this Board as follows:—

"Please allow me to ask of you a little information. At this place and near by along the railroad, on its right of way, are places from where the railroad builders took earth for filling, that do now and at all times contain and hold bad stagnant water. I have complained to and notified said railroad company that it must be let off by constructing a suitable ditch, for which there is a good chance; but said company has done nothing but talk and promise all summer about said ditch. Now can I compel them or can they be compelled to open that ditch, and how should I proceed? Please favor with an early reply."

In reply to Mr. Chatfield's letter the Secretary of this Board wrote to him, Sept. 24, 1891, as follows:—

"In reply to your letter of September 21, relative to an alleged nuisance in your township caused by railroad company having dug pits along the line of the railroad to obtain dirt for making fills in grading the road-beds, which pits constantly contain stagnant water, Section 1640, Howell's Statutes, requires the local board of health to examine into all nuisances, sources of filth and causes of sickness that may, in their opinion, be injurious to the health of the inhabitants, and destroy, remove or prevent the same as the case may require.

"Section 7965, Howell's Statutes, gives the circuit court *equity* jurisdiction in all matters concerning nuisances where there is not a plain, adequate and complete remedy at law, and authorizes the court to grant injunctions to stay or prevent nuisances. If the court is not in session, application should be made to the circuit judge.

"If the local board of health refuses or neglects to make the proper complaint for the abatement of a nuisance injurious to health, any person injured or annoyed thereby may make complaint and prosecute a suit for the abatement of the nuisance as a public nuisance, or for damages by reason of the nuisance as a private nuisance, and for the abatement of the same.

"By this mail I send you a copy of our pamphlet, 'Work of Health Officers and of Local Boards of Health in Michigan,' on pages 9 and 10 of which are paragraphs bearing on the subject of nuisances. I also enclose two pamphlet publications of this Board bearing on the subject of nuisances.

"I have asked the attention of the local board of health to this subject. If this Office can be of any further service to you in this case it will give me pleasure."

On the same date (Sept. 24, 1891,) the Secretary wrote also to Mr. Elmer Desvoignes, president of the board of health of Duncan township, informing him of the complaint made in Mr. Chatfield's letter, calling his attention to sections 1640 and 7965 of Howell's Statutes, enclosing pamphlet publications of this Board bearing on the subject of nuisances, and stating that he would be glad to be informed whether or not, on examination, this alleged nuisance proved to be a nuisance, and, if it is, what measures are taken for its removal or abatement, and with what result.

COW YARD NEAR DWELLING, AN ALLEGED NUISANCE.

Mr. Wm. E. Sherman, a resident of the village of Coopersville, Ottawa county, wrote to this Office, July 13, 1891, as follows:

"Edwin McNaughton rents a lot joining my lot, on which the fence is about twelve feet from my door, and he is yarding two or three cows in the lot every night. As the highest ground is in front of my door, the cows lay there and the smell is such that my family can hardly stay in the house. I have spoken to Mr. McNaughton about it and he does no different. I then spoke to the board of health of this place and Dr. Smith the physician of the board says he does not know as that can be called unhealthy. Now will you please take the matter in hand and see if there can be anything done? It is a sickly time of the year and for my part, I think it very unhealthy. Please answer."

July 15, 1891, the Secretary replied to Mr. Sherman's letter giving him all necessary information relative to the abatement of nuisances, and at

the same time sent him pamphlet publications of this Board containing the laws bearing on this subject.

By the same mail the Secretary wrote also to the president of the board of health of the village, informing him of Mr. Sherman's complaint, and calling his attention to Section 1640, Howell's Statutes, which makes it the duty of local boards of health to "examine into all nuisances, sources of filth, and causes of sickness that may, in their opinion, be injurious to the health of inhabitants, and destroy, remove, or prevent the same as the case may require."

IS A FLORIST'S COMPOST HEAP DANGEROUS TO HEALTH?

July 15, 1891, Dr. C. Van Zualuwenburg, health officer of the city of Kalamazoo, wrote to this Office as follows:—

"Can you inform me, or refer me to authority on the danger to health of a florist's compost heap? Kalamazoo has a florist who keeps 5 or 6 green-houses. He rots his manure out of town for two years; then when very fine he brings it into town in the spring and mixes it with earth thoroughly and keeps it on his lot in the midst of the residence part of the city, for use as he needs it for the year. Some of his neighbors say that it emits an offensive odor, but I am at a loss to decide whether it is sufficient nuisance to require it kept out of town. Can you tell me the position of other cities in regard to it?"

July 17, 1891, the Secretary of this Board wrote as follows in reply to Dr. Van Zualuwenburg's letter:—

"I think a florist's compost bed, managed in the way you describe, is not dangerous to the public health, and I doubt if it could be removed as a nuisance; although the courts sometimes decide that things are nuisances which have a very disagreeable odor, even when they do not cause disease."

AN OPEN SEWER IN STANTON, AN ALLEGED NUISANCE.

A. L. Corey, M. D., health officer of Stanton City, wrote as follows to this Office, June 8, 1891:

"We have in our city, on one of our principal streets, what I consider to be and have reported as such to our city board of trustees, a nuisance in the presence of an open ditch or sewer, which was dug for the purpose of draining a barnyard and pigpen, in the rear of a hotel barn and a low, or a piece of land with a sag or low formation. In this case the board refuses to tile and insists on the said sewer or ditch remaining open, which gives off a very unpleasant smell to say the least. What can I do further in the premises? Please so state and oblige.

June 9, 1891, the Secretary sent the following reply to Dr. Corey:

"Section 1640, Howell's Statutes, requires *boards of health* to examine all nuisances, sources of filth, and causes of sickness that may, *in their opinion*, be injurious to the health of inhabitants, and destroy, remove, or prevent the same as the case may require. Section 7965, Howell's Statutes, gives the circuit court *equity* jurisdiction in all matters concerning nuisances where there is not a *plain, adequate* and *complete* remedy at law; and authorizes the court to grant injunctions to stay or prevent nuisances. If the court is not in session, application should be made to the circuit judge.

"By this mail I send you a copy of our pamphlet, 'Work of Health Officers and of Local Boards of Health in Michigan,' in which I have marked paragraphs bearing on the subject of nuisances; and I also enclose two other pamphlet publications of this Board bearing on the subject of nuisances."

WHO SHOULD REMOVE NUISANCES?

June 9, 1891, Melvin E. Bates, clerk of Grayling township, wrote to the Secretary of this Board as follows:

"I write to you to obtain information in a case where a person refuses to remove a nuisance after being notified by the clerk of local Board of Health, claiming that no one has a right to order the removal of such nuisance except the health officer of Local Board. Please inform me how to act in this matter. Also if I do not intrude too much, please state the duties of health officer of Local Board of Health in regard to nuisances and the like.

"Please send me some of those Pamphlets like those I received from you."

In reply to Mr. Bates' letter, the Secretary of this Board wrote to that gentleman, June 10, 1891, as follows:

"No single officer of a township, city or village has authority to order the removal or abatement of a nuisance. That is the function of the *board of health*.

"By this mail I send you a copy of our pamphlet 'Work of Health Officers and of Local Boards of Health in Michigan' in which I have marked paragraphs bearing upon the subject of nuisances.

"I also enclose to you some other pamphlets published by this Board such as were sent you before, as you request."

WILD RICE IN ST. JOSEPH RIVER AN ALLEGED NUISANCE.

Edwin Stewart, M. D., health officer of Mendon village, St. Joseph county, wrote to this office, August 20, 1891, as follows:

"I enclose a clipping from our local paper of last week. It is like others made directly to me. I can see no remedy, can you? These are the facts, and conditions. Several years ago a quantity of wild rice was procured by parties in Colon, a village nine miles above us on the St. Joseph river and the rice sown in the river to bait ducks. It is said the practice is still continued. The result is, the seed floats down, seeds the shallow waters and produces the obstruction and the evil complained of. I have been requested to lay the matter before you and inquire if anything can be done to abate the nuisance."

Following is the clipping mentioned by Dr. Stewart:

"The rice in the St. Joe river is getting so thick that it threatens a pestilence. The heat has been almost overpowering the past few weeks and sweltering humanity has been turning in every direction for fresh air. Some of our neighbors residing near the river, on Main street, complain that when out on their back porches they would be cool and comfortable were it not for the stench that comes from the river. The rice is so thick it clogs up the river, dead fish, dead frogs and turtles, rats, cats, etc., are caught and detained and they impregnate the air with a sickening smell that threatens disease and death. Let the health officer look into this matter and apply the remedy. This case should be agitated until something is done to save our people from an epidemic, or at least from numerous cases of sickness."

In reply to Dr. Stewart's letter, the Secretary of this Board wrote August 22, 1891, as follows:

"In replying to your letter of August 20, 1891, relative to the nuisance caused by vegetable growths and accumulation of organic matter in the St. Jo. River, I send you, herewith, three pamphlets with paragraphs marked, bearing upon the subject. You will see that while the *Health Officer* has not the power to abate such a nuisance, the law requires the *local board of health* to immediately investigate every such alleged nuisance; and, when found in any public place, it is the duty of the board of health to 'destroy, remove, or prevent, as the case may require' –§1640 Howell's Statutes, page 9 'Public Health Laws in force in 1890.'

"I trust that you will at once bring this subject to the notice of your local board of health, and that they will take such action as will stop the nuisance. A similar nuisance in the Grand River, at Jackson, Michigan, some years ago, was abated by the board of health. It employed men to mow the water plants and to cause their removal from the stream below the city. In all cases where there is not a '*plain, adequate* and *complete* remedy at law,' §7965 Howell's Statutes, gives the circuit court equity jurisdiction and authorizes the judge to grant injunctions to stay or prevent the nuisance. If, for any such reason as that of lack of jurisdiction over a portion of the river, it is impossible for the local board of health to

he nuisance, application should be made to the circuit judge. I believe, however, in this instance, our local board of health has power to abate this nuisance, and that it is its duty to do so, in case nuisance which endangers the health of citizens."

SLAUGHTER-HOUSE REFUSE AN ALLEGED NUISANCE.

J. J. Smith, a resident of Clyde, Highland township, Oakland county, ote to this Office, Sept. 19, 1891, as follows:

Herewith I enter complaint against T. F. Arthur, hotel landlord and butcher of this place, for making ublic nuisance of his property, by leaving on his premises the refuse matter from his slaughter pen, d leaving it there to be eaten by his hogs or to decay in the sun, all within 25 feet of my door. I have ade complaint twice to our supervisor E. B. Wilhelm, but nothing has been done; and therefore place is my third complaint before your honorable body. Please attend to same and oblige."

In reply to Mr. Smith's letter the Secretary of this Board wrote to him, Sept. 21, 1891, informing him how to proceed to obtain the abatement of the alleged nuisance. On the same date the Secretary wrote, also, to Mr. Eugene B. Wilhelm, supervisor of Highland township, informing him of the complaint made by Mr. Smith, calling his attention to §§1640 and 7965 Howell's Statutes, which explain how nuisances may be abated and the duties of local boards of health relative to nuisances. The Secretary at the same time sent Mr. Wilhelm pamphlets published by this Board on the subject of nuisances.

In reply to the Secretary's letter, Mr. Wilhelm wrote, Sept. 23, 1891:

"Your letter of the 21st received. We held a meeting of the board of health this morning and took action in the matter. I would like to explain that last spring I was called to Clyde on the same complaint and found that the real cause was a bitter quarrel between this J. J. Smith and T. F. Arthur and where one party could do anything to cause the other trouble and expense it was being done. At the time I notified Arthur he would have to take care of the offal from his slaughtering in better shape, and not long ago I asked Smith if it was all right and he said it was. The fact of the matter now is this. The pen where the hogs are kept and the offal is fed, is between Arthur's barn and his house, and there is a yard and barn between Smith's house and the pen complained of, and Smith is located west of it all, so if there is any smell Arthur gets the most of it himself."

DEODORIZATION OF PRIVY-VAULTS.

August 13, 1891, Dr. James E. Taylor, health officer of the village of Ovid, Clinton county, wrote to this Office, as follows:—

"If you have any literature on the subject of how to deodorize the contents of privy-vaults, please forward me a few papers. We are having some complaints made as to the stench arising from such vaults. A quick reply will be an accommodation."

The following reply to Dr. Taylor's letter was sent from this Office, August 15, 1891:—

"By this mail I send you two pamphlets in which I have marked paragraphs bearing on the subject of the disinfection of privy-vaults. I also enclose some pamphlet publications of this Board on the subject of sewerage, disposal of excreta, etc., in which I think you may be interested."

DAM AT OUTLET OF LONG LAKE AN ALLEGED NUISANCE.

August 18, 1891, Mr. A. S. Johnson, supervisor of Morton township, and Dr. Frank Barry, health officer of Colfax township, Mecosta county, called at the Office of the Secretary of this Board and made complaint

"That the firm of Higby & Hugh (saw milling and grist milling) of Morley, Michigan, have placed a dam at the outlet of Long Lake by which they raise the level of the lake and of other lakes connected with it so as to flood considerable land in their vicinity, and that during the months of July, August and September, they lower the dam so as to supply power for their mills at Morley, thus using the lakes for a storage reservoir. By this process during the months of July, August and September, the water in the lakes is lowered from one to six or eight feet, exposing a large surface of the water-soaked ground; thus creating an offensive nuisance which endangers the health and lives of the people in that locality. It is alleged that residents in Morton and Colfax townships suffer from this nuisance."

Copies of pamphlet publications of this Board, bearing on the subject of nuisances and their abatement, were handed to Messrs. Johnson and Barry; and later, the Secretary of this Board wrote to Mr. Johnson relative to the abatement of this particular, alleged, nuisance.

DEAD FISH ON THE SHORES OF CRANBERRY LAKE.

Sept. 25, 1891, Hiram H. Essner, clerk of Wright township, Ottawa county, wrote to this Office, as follows:—

"Will you please answer the following questions? In the first place I will state the case.

"On the 13th day of August, 1891, a man named Gemer, who owns land on the bank of Cranberry Lake, came to my place and notified me that on the 12th, or the day before, the fish in said lake commenced dying and that thousands had washed to the shores on his side and had already commenced to smell. Now I started immediately and called out the board of health, and we met that afternoon and authorized one member of the board of health, to go on and engage the help necessary to gather up the dead fish and cause it to be buried. Said member did so and they gathered up three hundred bushels of fish. This lake lies three-fifths in Wright township, Ottawa county; and two-fifths in Alpine township, Kent county. We divided the paying of the expenses in that proportion, our share being about $27. Now we have men in the township that tell us that is a government lake and we had no right to do anything with it.

"One question is, if that is a government lake, did we do right, or was it all wrong? And where can I find out whether that is a government lake or not?

"Some of the parties living around are about to have the lake drained, and I claim they have no right to drain it."

In reply to Mr. Essner's letter, the Secretary of this Board wrote to him, Sept. 28, 1891, as follows:—

"In response to the qustions in your letter of September 25,—

"1. Cranberry lake is meandered, and belongs to the State of Michigan.

"2. In reply to your question as to whether your board had authority to remove and bury the fish,—Section 1640, Howell's Statutes, requires the local board of health to examine into all nuisances, sources of filth, and causes of sickness that may, in their opinion, be injurious to the health of inhabitants, and destroy, remove, or prevent the same as the case may require. Under this law, your board was required to abate the nuisance.

"3. You state that 'some of the parties living around are about to have the lake drained, and I claim they have no right to drain it.' In order to drain the lake *official* action on the subject would be required, either by the drain commissioner, or by the circuit judge.

"In case an attempt is made to drain the lake and it is thought that such drainage would be a nuisance, Section 7965, Howell's Statutes, gives the circuit court *equity* jurisdiction in all matters concerning nuisances where there is not a *plain*, *adequate* and *complete* remedy at law; and authorizes the court to grant injunctions to stay or prevent nuisances. If the court is not in session, application should be made to the circuit judge. If, however, the lake, as it is, is considered to be injurious to health, and it is thought desirable to have it drained, application should be made to the drain commissioner.

"By this mail I send you three pamphlet publications of this Board bearing upon the subject of nuisances."

FOUL CLOSET AND WELL, ALLEGED NUISANCES.

Sept. 26, 1891, a resident of Lansing made complaint to this Office of an alleged nuisance in this city, on the northwest corner of Chestnut and Allegan streets, "the nuisance being a closet and a well which have been filled with all leavings, and have become unbearable to the people in the vicinity."

This complaint was referred to C. H. Brucker, M. D., health officer of the city, and his attention called to sections 1640 and 7965, Howell's Statutes, which bear on the subject of nuisances and their abatement.

Sept. 28, 1891, the following letter was received from Dr. Brucker:—

"I thank you for calling my attention to this. I find it a full-fledged nuisance, mainly in the shape of an abandoned well, and for convenience is being used for sewer purposes. It is about half full of reeking filth. I have ordered well and privy cleaned and the well filled with earth."

ODOR FROM A PERSON SICK WITH CATARRH ALLEGED TO BE A NUISANCE.

The following letter, dated Oct. 3, 1891, was received at this Office, from C. S. Snell, M. D., health officer of the village of Vermontville:—

"In school district No. 3 of this township there is complaint of a child whose parents persist in sending to school, having catarrh so bad that the odor from his nose is so offensive that it makes other children sick. What should be done about it?"

In reply to this letter the Secretary of this Board wrote to Dr. Snell, Oct. 7, 1891:—

"I think there is no remedy at law for cases like the one you mention. But in all cases concerning nuisances where there is not a *plain*, *adequate* and *complete* remedy at law, application should be made to the circuit judge under §7965, Howell's Statutes."

SAWDUST THROWN INTO GRAND RIVER AN ALLEGED NUISANCE.

The following document was forwarded to this Office by John M. Gallery, M. D., health officer of the city of Eaton Rapids:—

"*Eaton Rapids, October 13, 1891.*

"*To the Secretary of the State Board of Health for the State of Michigan:*

"DEAR SIR:—A petition signed by many prominent citizens of the city of Eaton Rapids, was presented to the Common Council, relative to the throwing into Grand river large quantities of sawdust, at the C. Smith's mill, which is about a half mile outside the city limits, for the reason, as is alleged, that it obstructs the free flow of said river, which flows through our city, rendering the stream a source of ill health to its citizens, etc.

"The Common Council took action upon the matter, ordering the same to be referred to the State Board of Health for its action. We therefore ask the co-operation of that Honorable Body to take such action as it may deem advisable and report its doings to the Common Council of the city of Eaton Rapids.

"H. C. MINNIE,
"E. D. CORBIN,
"*Health Committee.*
"JOHN M. GALLERY, M. D.,
"*Health Officer.*"

On receipt of the above-quoted document, the Secretary of this Board wrote to each of the signers of the document and to the president of the board of health of the city of Eaton Rapids, calling their attention

to Sections 1640 and 7965, Howell's Statutes, which bear on the subject of nuisances; and at the same time sent, to each, pamphlet publications of this Board which fully explain the mode of procedure necessary to legally effect the abatement of nuisances.

In 1891, as compared with previous years, there was a marked decrease in the number of nuisances reported to this Office. It is possible that this decrease is due to the dissemination of information by means of pamphlet publications of this Board, which are, each year, largely distributed throughout the State.

In articles on alleged nuisances, published in previous Annual Reports of this Board, attention was called to the fact that a very large proportion of the communications received at this Office in regard to alleged nuisances, came from local health officers and other township, city and village officials, asking for information relative to points of law concerning nuisances, or requesting advice as to their duties, or to the proper legal procedure necessary to effect the prevention or abatement of nuisances. The correspondence of 1891, shows a similar desire on the part of local health officials for advice and coöperation of this Board, which has been freely and cheerfully given, and, it is believed, with beneficial results to the public health.

Copies of the revised edition of the compilation of the health laws of the State, including those which relate to nuisances, made by the Secretary of this Board; also of the laws of the State relating to nuisances,—in pamphlet form—may be obtained by those concerned, on application to the Secretary of the State Board of Health.

INJURIES AND LOSS OF LIFE AND PROPERTY ALLEGED TO HAVE BEEN CAUSED BY THE USE OF KEROSENE, IN MICHIGAN, DURING THE YEAR ENDING DECEMBER 31, 1891.

Continuing a practice pursued in previous years, the office of the Secretary of the State Board of Health, has, during the year 1891, sought to obtain information relative to each casualty, alleged to have been caused by the use of kerosene, which came to the notice of said office.

The principal sources from which this office obtains facts in regard to such casualties as above mentioned, are four, viz.: from reports by the Fire Marshal of Detroit, State Inspectors of Illuminating Oils, Local Health Officers, and from newspaper reports. Relative to the last of these sources of information, it should be stated that the Secretary of this Board does not accept as authentic, newspaper reports of casualties from the use of kersosene. When such reports come to his knowledge, he applies to the proper officials of the localities in which they are said to have occurred, for confirmation, or contradiction of the reports, and for any information which these officials may be able to give in connection with the alleged casualties. A copy of the form of letter used on such occasions, is inserted hereafter in this article. The data collected from these sources, show that during the year 1891, information was received at this office, of the occurrence of 148 casualties consequent on the use of kerosene in Michigan. These casualties were reported to have occurred in 56 localities, causing loss of 11 lives, injury (non-fatal), to 16 persons, and damage of property to the amount of $52,828.

This reported damage does not include all the actual pecuniary loss occasioned by the above-mentioned casualties, because in very many instances where houses, barns, and other property were destroyed, the loss was not reported.

The following tables and lists of casualties show the localities in which the casualties occurred, the nature of each casualty, the damage caused thereby, and whatever other details in regard to them this office has been able to collect.

TABLE 1.—*Casualties in Michigan during the year 1891, believed to have been consequent on the use of Kerosene, information of which was received at the Office of the Secretary of the State Board of Health. In the first six months of this year the legal test was a Flash Test at 120 degrees Fah., in a closed tester. In the last six months of the year the legal test was a Burning Test at 120 degrees Fah., in an open tester.*

	Number of Casualties.	Number of Localities.	Pecuniary losses. Dollars.	Lives lost.	Persons injured (not fatally).
In Detroit	55	1	12,638	2	1
In State (outside Detroit)	93	55	40,190	9	15
Totals	148	56	52,828	11	16

List of Casualties Consequent on the use of Kerosene, in Detroit, Calendar Year, 1891.
(Supplied by William H. Baxter, Fire Marshal in Detroit.)

Date in 1891.	Street and Number.	Nature of Casualty.	Amount of Damage.	Injury to Person.
Feb. 8	316 Woodward Ave..	Lamp exploded.....	$900 00	
Feb. 14	22 Charlotte Ave...	Stove exploded	18 00	
Feb. 23	412 Howard Street..	Lamp exploded.....	5 00	
Mar. 18	270-2 Bagg Street ..	Stove exploded	.....	
Mar. 22	63 Brady Street....	Lamp exploded.....	441 00	
April 8	53 Rowland Street.	Lamp exploded.....	105 00	
April 16	892 Lafayette Ave ..	Lamp exploded.....	5 00	
April 21	Foot of Hastings St.	Lamp exploded.....	10 00	
May 1	662 Michigan Ave...	Lamp exploded.....	.....	
June 2	698 Scotten Ave	Lamp fell to floor and was smashed	5 00	
June 19	23 Schulte Ave	Chicken coop saturated with kerosene and set fire to by owner.....	175 00	
June 25	233 Grand River Ave.	Lamp exploded.....	1,204 00	
June 28	844 Dubois Street...	Lamp exploded.....	5 00	
June 29	1021 Trumbull Ave..	Lamp fell off bracket, oil ignited---- ---- -----	5 00	
July 15	663 St. Aubin Ave...	Oil stove leaked.....	86 00	
July 24	166 Myrtle Street...	Lamp exploded.....	1,729 00	
July 28	881 Gratiot Ave....	Lamp exploded.....	.....	
July ..	* 56 Grand River Av.	Lamp exploded.....	.....	
Aug. 6	505 Bagg Street....	Lamp exploded.....	.....	
Aug. 7	347½ Woodward Ave.	Lamp exploded.....	.....	
Aug. 8	51 Porter Street ...	Stove exploded.....	56 00	
Aug. 8	948 Chene Street....	Lamp exploded.....	75 00	
Aug. 11	998 Michigan Ave...	Lamp exploded.....	25 00	
Aug. 17	360 E. Woodbride St.	Lamp exploded.....	20 00	
Aug. 21	50 28th Street	Drunken man upset lamp.....	15 00	
Sept. 1	179 Brewster Street.	Lamp placed too close to ceiling.....	334 00	
Sept. 2	816 Fourth Ave.	Leaking cook stove....	10 00	
Sept. 15	855 Monroe Ave.	Stove exploded.....	10 00	
Sept. 19	114 Champlain St. ..	Lamp exploded.....	1,021 00	
Sept. 21	248 Fourth Street...	Lamp exploded.....	10 00	
Sept. 24	1568 River Street ...	Lamp exploded.....	.....	
Sept. 25	77 Atwater E.	Lamp exploded.....	160 00	
Oct. 7	73 Piquette Ave. ...	Oil ignited with hot soldering iron and killed two men.....	500 00	Two men fatally burn'd
Oct. 10	113 Russell Street ..	Lamp exploded.....	162 00	
Oct. 11	305 McDougall Ave..	Lamp exploded.....	50 00	
Oct. 21	86 Napoleon Street.	Lamp exploded.....	222 00	
Oct. 24	43 Catherine Street.	Lamp exploded.....	35 00	
Oct. 26	48 Brewster Street.	Stove exploded.....	48 00	
Oct. 28	596 E. Canfield Ave..	Lamp exploded.....	1,220 00	
Nov. 6	707-9 Clinton Street.	Lamp exploded.....	663 00	
Nov. 9	41-3-5 Congress St..	Careless handling of lamp.....	125 00	
Nov. 9	72 Linden Street...	Lamp exploded.....	1,000 00	
Nov. 11	413 Alfred Street ...	Lamp exploded.....	273 00	
Nov. 16	683 Michigan Ave...	Lamp fell from fasten'g.	.....	
Nov. 20	594 McDougall Ave..	Lamp exploded.....	800 00	
Nov. 23	20 Howard Street..	Stove exploded.....	71 00	
Dec. 5	1192 Jefferson Ave...	Lamp exploded.....	75 00	Woman severely burn'd

* This Casualty was reported by J. D. Long, Deputy Oil Inspector.

List of Casualties Consequent on the Use of Kerosene in Detroit, in 1891.—CONTINUED.

Date in 1891.	Street and Number.	Nature of Casualty.	Amount of Damage.	Injury to Person.
Dec. 7	148 E. Columbia	Lamp exploded	$10 00	
Dec. 15	60 Monroe Ave.	Lamp exploded	50 00	
Dec. 16	208 Jefferson Ave.	Man putting a lamp in bracket dropped it on floor	75 00	
Dec. 16	* Not given	Hanging lamp fell and oil ignited		
Dec. 21	161 23d Street	Lamp exploded	500 00	
Dec. 23	2 & 4 Catherine St.	Lamp flashed up as if to explode and in handling it was dropped on floor	5 00	
Dec. 23	350 Antoine Street	Lamp exploded	300 00	
Dec. 28	609 Wabash Ave.	Stove exploded	25 00	

*This Casualty was reported by J. D. Long, Deputy Oil Inspector.

List of Casualties consequent on the use of Kerosene in Michigan outside the city of Detroit, calendar year 1891.

Date in 1891.	Locality.	Nature of Casualty.	Amount of Damage.	Injury to Person.
Jan. 8	Brookfield Township	Lantern exploded	$1,200 00	
Jan.	Tittabawassee Township	Lamp explosion	700 00	
Feb. 21	Saginaw	Careless use of kerosene. Woman and child fatally burned		Woman and child fatally burned.
Feb.	Deerfield Township	Lantern exploded in barn	500 00	
Mar. 20	Ionia	Lamp exploded, causing fire		
Mar.	Marquette	Lamp explosion, causing fire	4,000 00	
Apl. 25	Flint	Lamp exploded, set fire to grocery store	1,200 00	
May 9	Lansing	Alleged lamp explosion	100 00	
May 26	Kalamazoo	Kerosene in stove ignited. Woman badly burned		Woman badly burned.
May	Pierson Village	Explosion of kerosene	200 00	
July 17	Kalamazoo	Fire in residence, caused by an oil stove	1,000 00	
July 28	Kalamazoo	Lamp exploded, set house on fire		
Aug. 6	Athens	Explosion of street lamp		
Aug. 9	Benton Harbor	Boy fatally burned trying to light a fire with kerosene		Boy fatally burned.
Aug.	Adrain	Man, wife and daughter badly burned. Daughter tried to pour kerosene into a pan on gasoline stove		Three persons badly burned.
Aug. 16	Holland	Lamp in Episcopal church caused fire	120 00	

List of Casualties consequent on the use of Kerosene in Michigan.—CONTINUED.

Date in 1891.	Locality.	Nature of Casualty.	Amount of Damage.	Injury to Person.
Aug. 16	Albion	Lamp exploded and set house on fire	$55 00	
Aug. 29	Lansing	Supposed lamp explosion, house burned		
Sept. 5	Lansing	Lamp exploded at Walker's grocery store		
Sept. 6	Midland	Oil in oil stove ignited		
Sept. 11	Grand Rapids	Lamp explosion at home of Tunnis De Hann. House burned and child burned to a crisp	600 00	Child fatally burned.
Sept. 20	Leslie	Lamp explosion in post-office		
Sept. 21	Republic	Lamp explosion caused fire in office of the "Sun." Building and editor's furniture destroyed. Editor fatally burned		A Man fatally burned.
Sept. 23	Pontiac	Lamp explosion caused loss of house, etc.	100 00	
Sept. 27	Manistee	Fire supposed to be caused by over turned lamp	6,000 00	
Sept. 27	Kalamazoo	Lamp exploded		
Oct. 3	Lansing	Lamp overturned caused fire		
Oct. 7	Mio	Lamp burned up		
Oct. 13	Port Huron	Six year old child fatally burned by trying to light a fire with kerosene		Six years old child fatally burned.
Oct. 15	Muskegon	Lamp exploded in home of James Smith	2,000 00	
Oct. 21	Lansing	Lamp explosion caused fire at home of Mr. George Curtis. Mrs. Curtis' hands burned		A woman's hands burned.
Oct. 23	Mendon	L. E. Sherrod attempted to kindle a fire with kerosene. An explosion ensued. Mr. Sherrod was severely scorched		A man severely scorched.
Oct.	Nottawa	Lantern exploded, caused fire in barn		
Oct. 15	Kalamazoo	Fire caused by kerosene igniting in a lamp		
Oct. 31	Lansing	Oil stove caused fire at meat market of Wm. H. Decke	15 00	
Oct. 17	Lansing	Lady badly burned while trying to light a furnace with kerosene		A lady badly burned
Oct.	Martin township	Supposed lamp explosion. House and contents burned	300 00	

List of Casualties consequent on the use of Kerosene in Michigan.—CONTINUED.

Date in 1891.	Locality.	Nature of Casualty.	Amount of Damage.	Injury to person.
Nov. 1	Lansing	Oil stove caused fire at home of W. L. Rice	$100 00	
Nov. 1	Kalamazoo	Girl slightly burned while lighting furnace with kerosene	----------	A girl slightly burned.
Nov. 2	Kalamazoo	Man slightly burned while lighting fire in stove with kerosene	----------	A man slightly burned.
Nov. 2	Rockford	Lantern exploding caused fire in barn	1,300 00	
Nov.	Corey	Lantern exploded causing barn to burn	1,500 00	
Nov. 5	Ypsilanti	Oil in kerosene stove exploded. Woman severely burned. Furniture, etc., burned	----------	Woman severely burned.
Nov. 6	Watertown township	Lantern exploded	----------	
Nov. 11	Addison	Lantern exploded in livery barn. A number of business and residence buildings burned	17,000 00	
Nov.	Watertown township	Lantern exploded	----------	
Nov.	Dushville	Explosion of a kerosene lamp in house of Mr. Tiffany caused fire in which his two children were fatally burned	----------	Two children fatally burned.
Nov. 12	Kalamazoo	Boy severely burned on hands and face while trying to light a furnace with kerosene	----------	Boy severely burned
Nov. 9	Grass Lake	Lantern exploded	----------	
Nov.	Bay City	Boy dangerously burned while trying to light a fire with kerosene	----------	Boy dangerously burned.
Nov.	Ithaca	Lamp explosion	----------	
Nov.	Grass Lake	Lantern exploded	----------	
Nov. 19	Albion	Lamp exploded	----------	
Nov. 22	Ann Arbor	Lamp exploded at house of W. W. Douglas, carpet and other furniture burned	100 00	
Nov.	Plainfield township	Lantern exploded. Barn and contents burned. Boy severely burned	1,000 00	Boy severely burned.
Nov.	Northfield	Lamp exploded. Furniture, etc., burned	----------	

List of Casualties consequent on the use of Kerosene in Michigan.—CONTINUED.

Date in 1891.	Locality.	Nature of Casualty.	Amount of Damage.	Injury to person.
Dec.	Port Huron	Lamp filled with low test oil exploded at house of James Shuttleworth. Much damage		
Dec. 4	Bay City	Lamp exploded in Golden's clothing store		
Dec. 6	Imlay City	Mrs. Rider fell with lighted lamp in her hand, lamp was broken, oil ignited, and Mrs. Rider was fatally burned		Woman fatally burned.
Dec. 6	Lake City	Lamp exploded at Occidental hotel	$50 00	
Dec. 8	Ann Arbor	Lamp exploded, one person slightly burned		One person slightly burned.
Dec. 12	Ann Arbor	Lamp exploded. Caused fire at Salyer's bakery	50 00	
Dec. 14	Ludington	Lamp explosion. Residence destroyed		
Dec. 16	Ann Arbor	Lamp exploded. Damage slight		
Dec. 19	Sigel township	Lamp exploded. Barn and contents burned	1,000 00	
Dec. 19	Traverse City	Lamp exploded at the "Front Street House"		
Dates not given.	Bay City	7 lamp explosions reported by health officer. No details given	Amount of damage not given.	
	Fife Lake Village	Fire caused by oil stove		
	Ithaca Village	Fire caused by oil stove		
	Caledonia Township	6 lamp explosions		
	Chase Township	Exposion of lamp filled with poor oil		
	Elk Township	Fire caused by lighting stove with kerosene		
	Empire Township	Fire caused by an overturned lantern		
	Rollin Township	2 fires caused by lamp explosions		
	Woodstock Township	Lamp exploded caused fire		
	Lake Township	Kerosene poured in stove caused fire		
	Pierson Township	Lamp either upset or exploded caused fire		
	Highland Township	Lantern explosion		
	Argyle Township	Lantern caused fire		
	Vernon Township	Fire caused by kerosene lantern		
	Mendon Village	Man trying to kindle a a fire with kerosene had his hands and face burned	------	A man severely burned.

TABLE 2.—**Casualties in Michigan** (*including the city of Detroit*) *during the year 1891, believed to have been consequent on the use of kerosene, information of which was received at the office of the State Board of Health.* In this year the legal test was a Flash Test at 120 degrees Fah., in a closed tester, for the first six months of the year; for the last six months of the year, the test was a Burning Test at 120 degrees Fah., in an open tester.*

Months.	Number of Casualties.	Pecuniary losses, Dollars.	Number of lives lost.	Persons injured (not fatally).	Number of casualties caused by lamp and lantern explosions.	Number of casualties caused by stove explosions.
January	2	1,900	0	0	2	0
February	5	1,428	2	0	3	1
March	4	4,441	0	0	3	1
April	4	1,320	0	0	4	0
May	4	300	0	1	2	0
June	5	1,394	0	0	2	0
Total first six months	24	10,778	2	1	16	2
July	6	2,815	0	0	4	0
August	13	366	1	3	8	1
September	15	8,345	2	0	10	1
October	18	4,552	3	3	9	1
November	26	23,932	2	6	17	2
December	19	2,140	1	2	14	1
Total last six months	97	42,050	9	14	62	6
Total for the year	121	52,828	11	15	78	8

* Twenty-seven casualties, reported to this Office, the dates of occurrence of which were not given, are not included in this table.

TABLE 3.—*Casualties in the city of* **Detroit** *during the year 1891, believed to have been consequent on the use of kerosene, information of which was received at the office of the State Board of Health. In this year the legal Test was a Flash Test at 120 degrees Fah., in a closed tester, for the first six months of the year; for the last six months of the year, the test was a Burning Test at 120 degrees Fah., in an open tester.*

Month.	Number of Casualties.	Pecuniary losses, Dollars.	Number of lives lost.	Persons injured (not fatally).	Number of casualties caused by lamp explosions.	Number of casualties caused by stove explosions.
January	0	0	0	0	0	0
February	3	923	0	0	2	1
March	2	441	0	0	1	1
April	3	120	0	0	3	0
May	1	Not reported.	0	0	1	0
June	5	1,394	0	0	2	0
Total first six months	14	2,878	0	0	9	2
July	4	1,815	0	0	3	0
August	7	191	0	0	5	1
September	7	1,545	0	0	4	1
October	7	2,237	2	0	5	1
November	7	2,932	0	0	4	1
December	9	1,040	0	1	5	1
Total last six months	41	9,760	2	1	26	5
Total for the year	55	12,688	2	1	35	7

TABLE 4,—**Casualties in Michigan** (*outside the city of Detroit*) *during the year 1891, believed to have been consequent on the use of kerosene, information of which was received at the office of the State Board of Health.* In this year the legal Test was a Flash Test at 120 degrees Fah., in a closed tester, for the first six months of the year; for the last six months of the year, the test was a Burning Test at 120 degrees Fah., in an open tester.*

Month.	Number of Casualties.	Pecuniary losses, Dollars.	Number of lives lost.	Persons injured (not fatally).	Number of casualties caused by lamp explosions.	Number of casualties caused by stove explosions.
January	2	1,900	0	0	2	0
February	2	500	2	0	1	0
March	2	4,000	0	0	2	0
April	1	1,200	0	0	1	0
May	3	300	0	1	1	0
June	0					
Total first six months	10	7,900	2	1	7	0
July	2	1,000	0	0	1	0
August	6	175	1	3	3	0
September	8	6,700	2	0	6	0
October	11	2,315	1	3	4	0
November	19	21,000	2	6	13	1
December	10	1,100	1	1	9	0
Total last six months	56	32,290	7	13	36	1
Total for the year	66	40,190	9	14	43	1

* Twenty-seven casualties reported to this Office, the dates of occurrence of which were not given, are not included in this table.

Table 3, based on the data contained in the list of casualties in Detroit, shows that during the year 1891, there were 55 casualties reported to have occurred in that city from the use of kerosene, which casualties, resulted in pecuniary losses amounting to $12,638.00, loss of lives of two persons, and non-fatal injuries to one person. It may also be seen by reference to said table (3) that of the 55 above-mentioned casualties, 35, or nearly 64 per cent, were attributed to lamp and lantern explosions, and 7, or nearly 13 per cent, to oil-stove explosions.

Table 4, in which the data contained in the list of casualties reported to have occurred in the State, *outside Detroit*, are summarized, shows that the 66 reported casualties of which dates of occurrence and other details were given, resulted in pecuniary losses amounting to $40,190.00, the loss of lives of nine persons and non-fatal injuries to 14 persons; and that 43 (about 65 per cent) of the casualties were attributed to lamp and lantern explosions and one (about 1.5 per cent) to an oil-stove explosion.

Table 2, in which the data contained in tables 3 and 4 are combined, shows that in the *State, including* the city of Detroit, there were reported to have occurred 121 casualties, resulting in pecuniary losses amounting to $52,828.00, the loss of lives of 11 persons, and non-fatal injuries to 15 persons. Seventy-eight (about 64 per cent) of these casualties were attributed to lamp and lantern explosions, and eight (over 6 per cent) to oil-stove explosions.

Twenty-seven casualties contained in the list of reported casualties in the State, outside Detroit, although they form part of the data used in table 1, are not included in tables 2 and 4, because the dates of occurrence and other necessary information are wanting.

If we combine the data relative to these 27 casualties with those contained in table 2, we find that the total number of casualties reported to have occurred in the State (including Detroit) during the year was 148, which were attended with pecuniary losses amounting to $52,828.00, loss of 11 human lives, and non-fatal injuries to 16 persons; and that 93 casualties (nearly 63 per cent of all casualties) were attributed to lamp and lantern explosions, and 8 (over 5 per cent of all casualties) to oil-stove explosions.

The forty-seven casualties (nearly 32 per cent of all casualties) which are not attributed to lamp, lantern, or oil-stove explosions, were reported to have been due to the following causes:—kerosene spilt on floor ignites, 1; supposed lamp explosions, 2; oil in oil-stoves ignites, 3; supposed to have caught from oil-stoves, 3; attempting to light fires with kerosene, 11; defective burner on lamp, 1; overturned lamps, 5; oil in lamps igniting, 9; oil from broken lamps igniting, 6; leaking oil stove, 1; other careless usage of kerosene, 5.

Casualties from the use of kerosene in 1891 compared with previous years.

The following three tables (5, 6 and 7), based, for 1891, on the data from which preceding tables in this article are constructed, and for 1889 and 1890 on similar data for those years, are designed to facilitate comparison of the numbers of casualties and resultant damage, which occurred in the State from the use of kerosene during those years.

In tables 5 and 6, the year 1891 is divided into two parts, one comprising the first six months and the other the last six months of the year. The reason for this division is, that the law regulating the legal test of kerosene in the State was, by legislative enactment, changed during this year; the new law becoming operative on July first. This arrangement of tables 5 and 6, therefore, gives opportunity not only for comparison of the prevalence of casualties in 1891 with the previous two years; but also of the comparative prevalence of casualties in the first and last halves of 1891, under the provisions of the old and new test laws.

In 1889, 1890 and the first six months of 1891, the legal test of kerosene in this State was a *Flash* test at 120 degrees Fah. in a *closed* tester; that is, that the sale and use of oils which, in a *closed* tester, similar to a lamp, would emit an explosive vapor at a temperature lower than 120 degrees Fah. was prohibited. The new law, which took effect July 1, 1891, made the legal test a *Burning* test at 120 degrees Fah. in an *open* tester. That

is, the new law prohibited only the sale of kerosene which would *burn*, in an *open* tester at a lower temperature than 120 degrees Fah. As kerosene will emit an explosive vapor at a much lower temperature than that at which it will continue to burn in the open air where the vapor is carried away as fast as formed, and because of the variations in tests in an *open* tester, dependant on varying atmospheric currents and conditions, it is believed that the new *burning* test, at 120 degrees Fah. would probably average not more than equal to a *Flash* test at 100 degrees Fah. in a *closed* tester. That is to say, that an oil which would burn at a temperature of 120 degrees Fah. in an *open* tester, would probably, when heated to a temperature of 100 degrees Fah. in a *closed* tester, emit explosive gas which would flash; although the same oil if heated in an *open* tester, might, under some conditions, not flash at a temperature lower than 110 degrees Fah.

In a series of 64 experiments made by Dr. R. C. Kedzie,* with kerosene obtained from various sources, it was found that oils the average *burning* temperature of which was 128 degrees Fah., *flashed* at an average temperature of 117 degrees Fah. Based on the same proportion, oils which would *burn* at 120 degrees Fah. would emit explosive gas which would *flash* at a temperature of 109.7 degrees Fah.

Experiments made by Prof. Chandler † to ascertain the temperature of kerosene in lamps after they had been burning a number of hours, showed that in one instance he found the temperature 120 degrees, in another 118 degrees, and in another 104 degrees; an average temperature for the three instances of 114 degrees, which is 4.3 degrees higher than the average *flashing* point of oils, the average *burning* point of which is 120 degrees Fah. These experiments seem to show that oil in burning lamps sometimes attains a higher temperature than the *flashing* point of oils whose *burning* point is 120 degrees Fah. It would therefore seem that oils which would meet the requirements of the new, Michigan, legal test, may, in burning lamps, attain a higher temperature than that at which they would emit explosive gas, and are, therefore, dangerous; for, no oil can be considered safe for illuminating purposes which will give off an inflammable vapor at the highest temperature reached in lamps. This assumption—based upon experiments—that oils bearing the new legal test are unsafe, seems to be demonstrated by actual experience collected in tables 5 and 6, which show, both in the city of Detroit and in the whole State, that there was a large increase in the number of casualties from the use of kerosene in 1891 over 1890, and that this was caused by the increase in the number which occurred in the last half of 1891.

* Published in the First Annual Report for 1873, of the Secretary of the Michigan State Board of Health, pages 44 and 45.

† First Annual Report, for 1873, of the Secretary of the Michigan State Board of Health, page 55.

TABLE 5.—*Exhibiting the numbers of casualties believed to have been consequent on the use of Kerosene* **in Michigan** *(including the city of Detroit) information of which was received at the office of the Secretary of the State Board of Health in each of the three years 1889–1891. In the years 1889, 1890, and the first half of 1891, the legal test was a Flash test at 120 degrees Fah., in a closed tester; and in the last half of 1891 it was a Burning test at 120 degrees Fah., in an open tester, which, because it varies greatly, is equal to a Flash test of from 95 to 110 degrees Fah., but probably averages only about equal to a Flash test of 100 degrees Fah., in a closed tester.*

Year.	Number of Casualties.	Amount of damage done, Dollars.	Number of Lives lost.	Number of Casualties caused by Lamp explosions.	Number of Casualties caused by Stove explosions.
1889	53	† 74,049	8	16	2
1890	55	18,282	2	22	6
First six months of 1891	* 30	10,778	2	* 19	2
Last six months of 1891	* 118	42,050	9	* 74	6
Total for year 1891	148	52,828	11	93	8

* Included in these numbers are data relative to 27 reported casualties in 1891, of which the exact dates of occurrence were not reported. In order to make an equitable distribution of these between the first and last halves of the year a proportionate division of them is made, based on the data contained in Table 2 of this article, thus: Table 2 shows that, *exclusive* of the above-mentioned 27 casualties, there were reported 121 casualties in the State, in 1891; that 24 (about 20 per cent) of these, occurred in the first half of the year, and 97 (about 80 per cent) occurred in the last half of the year. The 27 casualties, the dates of which are not given, are divided between the first and last halves of the year in the same proportion, that is, 20 per cent of them are added to the first half, and 80 per cent to the last half of the year.

† The total reported damage ($74,049) for 1889 includes, $40,000 damage caused by a single fire at 678 Jefferson street, Detroit. The fire was caused by a careless manipulation of an oil heater used for heating a conservatory, and "was not the result of the grade of the oil used."

TABLE 6.—*Exhibiting the number of Casualties believed to have been consequent on the use of kerosene in* **Detroit** *during each of the years, 1889–1891. (Reported by the Fire Marshal of Detroit to the Office of the State Board of Health.) In the years 1889, 1890 and the first half of 1891 the legal test was a Flash test at 120 degrees Fah., in a closed tester, and in the last half of 1891 in was a Burning test at 120 degrees Fah., in an open tester, which because it varies greatly, is equal to a Flash test of from 95 degrees to 110 degrees Fah., but probably averages only about equal to a Flash test of 100 degrees Fah. in a closed tester.*

Year.	Number of Casualties.	Amount of damage done, Dollars.	Number of lives lost.	Number of casualties caused by lamp explosions.	Number of casualties caused by stove explosions.
1889	35	* 65,250	3	14	2
1890	44	18,282	0	15	6
First six months of 1891	14	2,878	0	9	2
Last six months of 1891	41	9,760	2	26	5
Total for year 1891	55	12,638	2	35	7

* The total reported damage (65,250 dollars) for 1889 includes, $40,000 damage caused by a single fire at 678 Jefferson street. The fire was caused by careless manipulation of an oil heater used for heating a conservatory, and "was not the result of the grade of the oil used."

TABLE 7.—**Casualties in Michigan** *(including the city of Detroit) in each of the years 1889–1891, believed to have been consequent on the use of Kerosene, information of which was received at the Office of the State Board of Health. In the years 1889 and 1890, and the first half of 1891, the legal test was a Flash test at 120 degrees Fah., in a closed tester; and in the last half of 1891 it was a Burning test at 120 degrees Fah., in an open tester, which, because it varies greatly, is equal to a Flash test of from 95 degrees to 110 degrees Fah., but probably averages only about equal to a Flash test of 100 degrees Fah., in a closed tester.*

		Total for the year.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1889	Number of Casualties	53	8	2	4	4	2	4	2	6	6	1	7	7
	Number of Localities	25	5	1	2	2	2	1	2	3	3	1	1	2
	Amount of Damage reported	*$74,049	$147	$105	$2,600	$2,456	§	$345	$7,080	$1,321	$1,983	$8,000	$11,606	$13,406
	Lives lost	8	2	0	1	4	0	0	0	0	1	0	0	0
1890	Number of Casualties	†48	5	1	3	4	4	4	4	4	5	3	5	6
	Number of Localities	17	2	1	2	1	2	1	1	2	1	1	2	1
	Amount of Damage reported	$18,282	$313	$339	$165	$640	$1,195	$1,586	$2,410	§	$1,414	$5,138	$96	$3,486
	Lives lost	2	1	0	0	0	0	0	0	0	0	0	1	0
1891	Number of Casualties	‡121	2	5	4	4	4	5	6	13	15	18	26	19
	Number of Localities	66	2	3	3	2	4	1	2	7	9	8	16	9
	Amount of Damage reported	$52,8:8	$1,900	$1,423	$4,441	$1,320	$300	$1,394	$2,815	$366	$8,245	$4,552	$23,932	$2,140
	Lives lost	11	0	2	0	0	0	0	0	1	2	3	2	1

* The total reported damage ($74,049) for 1889, includes $40,000 damage caused by a single fire, at 678 Jefferson street, Detroit.

† The total of casualties (48) here given for 1890, does not include 7 casualties, in 7 localities, reported by health officers, of which the exact dates of occurrence and other details were not reported.

‡ The total of casualties (121) here given for 1891, does not include 27 casualties in 15 localities, reported by health officers, of which the exact dates of occurrence and other details were not reported.

§ Not reported.

Letter from Henry F. Lyster, M. D., of Detroit, Medical Director of the Michigan Mutual Life Insurance Company.

"*Detroit, Sept. 24, 1891.*

"My Dear Doctor—Will you please send me a report of the number of lamp explosions in this State the year before the legislature reduced the kerosene oil test below the safety line, and the number which have occurred since the enactment of the law?

"Have previous legislatures come near reducing the test?

"What is the influence at work to destroy the Michigan inspection of oils? What is the object? What will citizens of this State gain by it? Has the State Board of Health been delinquent in the matter of informing the legislature and the commonwealth of the necessity for a high standard?

"How many lamps will explode next winter? How many people will burn to death? How many millions of dollars worth of property will be destroyed? How will the profit stand when a balance is struck? Do we want kerosene cheaper? Is it not cheap enough now? Do we want inferior oil brought into this State?

"After the work done by Prof. Kedzie and by other members of the State Board these seventeen years, and after the cords of circulars and reports distributed among the people, it would seem to me that there was nothing more to be said in favor or against the test.

"'Eternal vigilance is the price of liberty' and of safety as well.

"Do for heaven's sake flood the State with your own excellent headlights and that of the State Board, and awaken the oldest inhabitants, from the River Raisin to the Porcupine mountains, on this most vital interest.

"Very respectfully,

"Your obedient servant,

"Henry F. Lyster."

"To H. B. Baker, Sec'y, Etc.

"MICHIGAN STATE BOARD OF HEALTH,
"Office of the Secretary,
"*Lansing, Mich., October 1, 1891.*

"Henry F. Lyster, M. D., *Detroit, Michigan:*

"Dear Doctor—In reply to your letter of September 24, asking numerous questions,—You may remember that under the amended laws, a few years after the State Board of Health began its work, many years passed without there being casualties in Michigan which could be traced to the use of kerosene oil. 'Comparative safety made the people forgetful of past horrors, and the legislature in 1879 reduced the test to 120° F., and abolished the chill-test. Even this law retained a greater degree of safety than was ever reached before the vigorous action by the Michigan State Board of health.'* Under the late law, 120° F., *flash* test, in tester approved by the State Board of Health, the number of casualties (fires, explosions, etc.) believed to have been caused by kerosense reported to this Office by health officers and other officials as having occurred in Michigan, during the three years, 1886-88, were, during the year 1886, 5; in 1887, 3, and in 1888, 6. During the three months since the new law, 120° F., *burning* test in an open tester, took effect July 1, 1891, there have been reported to this Office up to October 1, 17 casualties (fires, explosions, etc.) believed to have been from kerosene; 11 of which have been already officially confirmed, as you will see by the table herewith enclosed. Some of these resulted from what would seem to be gross carelessness. That was also true of some in former years.

"The State Board of Health has not been delinquent on the subject of putting before the people the *facts* relative to the use of light, inflammable oil for illuminating purposes. At the meeting of the Board at Lansing, April 14, 1885, the subject was thoroughly considered, and the Board published the result—'That in the opinion of the Board there is not sufficient evidence of the safety of oils which flash at temperatures lower than 120° F., to warrant the lowering of the test now required for illuminating oils in Michigan.' Nearly every one of the Annual Reports of the Board has contained facts bearing upon the subject. In several of the Reports were published accounts of experiments tending to show the sources of danger. But in the very first Report of this Board is such a complete exhibition of the facts that, since the publication of that Report, there has been throughout the intelligent classes of our people a good degree of knowledge on the subject, and this has, heretofore, stood in the way of some of the

* From "The Health Service of a State" by Dr. George E. Ranney.

efforts of lobbyists before the legislature to get the test reduced. As you know, however, the test has been lowered several times, until now it is down near where it was at the time when so many casualties occurred that the legislature, in 1873, made the test one hundred and fifty degrees, *flash* test, and required it to be made with a tester approved by the State Board of Health. That, and the subsequent law which added a chill test, to exclude paraffine, had the result that an immediate stop was put to the casualties from the use of kerosene oil. And I do not remember that the price of illuminating oil in Michigan was increased; I think it was not increased. The price of oil has been declining so that now even the refined oil is considered, in many circumstances, a cheap fuel—kerosene stoves being extremely common.

"It is to be feared that, as cold weather comes on and more lights are used, the number of casualties from the use of the light oil now permitted to be sold in Michigan will increase. Whether or not anything further can now be done to prevent this is an important question. Something important has already been done in Lansing, one or more of the oil dealers having advertised that they will keep for sale the safer oil formerly required by law.

"Very respectfully,

"HENRY B. BAKER,

"*Secretary.*"

Casualties believed to be consequent on the use of Kerosene Oil in Michigan, during the three months, July 1 to October 1, 1891, notice of which has been received at the Office of the State Board of Health, and the probable occurrence of which has been confirmed by oil inspectors or health officers. In some of these instances there seemed to be gross carelessness.

Date of Occurrence, 1891.	Where occurred.	Nature of Casualty.
July 17	Kalamazoo	House burned; fire caught from an oil-stove.
July 27	Kalamazoo	Lamp explosion.
July 28	881 Gratiot Ave., Detroit	Lamp explosion.
Aug. 4	948, Corner of Chene St. and Hancock Ave., Detroit	Lamp explosion.
Aug. 10	Benton Harbor	Child burned to death while lighting a fire.
Aug. 16	Albion	Lamp explosion.
Sept. 5	Lansing (Walker's grocery)	Lamp explosion.
Sept. 20	Leslie	Lamp explosion in postoffice.
Sept. 24	Pontiac	Lamp explosion, causing house to be burned.
Sept.	Midland	Explosion of oil in oil-stove.
	Grand River Ave., Detroit	Lamp explosion.
	Instances reported but not yet officially confirmed.	
Aug. 16	Holland	Explosion of big lamp in Grace Episcopal church.
Aug. 29	Lansing (Shultz House)	Lamp explosion.
Sept. 11	Grand Rapids	Lamp exploded and a boy burned to a crisp.
Sept. 21	Republic	Lamp explosion; W. F. Montgomery fatally burned.
Sept. 27	Manistee	Lamp explosion; $6,000 hotel burned, man injured.
Sept. 30	Kalamazoo	Lamp explosion.

NOTE.—This last table, made before the receipt of the report of the fire marshal of Detroit and of the annual reports from city, village and township health officers, was necessarily incomplete, and therefore will be found not to accord with the completed compilations given earlier in this article.

About the first of October, 1891, a table and statement of the results of the change in the legal test for kerosene in Michigan was prepared by the Secretary of the State Board of Health, and handed to the newspaper reporters, for the general information of the public. The table was as complete as it could then be made. The statements and table were as follows:

Casualties apparently due to the use of Kerosene, during the third quarter of 1891.

In accordance with the custom of the office, the facts relative to each alleged lamp explosion, or other casualty, alleged to be due to kerosene oil, or to gasoline, have been asked for of the State Oil Inspector, and of the local health officers. All these officers have cheerfully coöperated with this office. It seems to be rather more than usually difficult for them to learn the facts, because of prejudices among the people, some charging every fire to kerosene oil, and some trying to make it appear, in every case that kerosene had nothing to do with it. Owing to the change in the method of testing, it has been found to be impracticable to learn the quality of the oil, as relates to the temperature at which it gives off an explosive vapor in a lamp or in a closed tester, there being now no official test for this purpose,—the inspectors now use an open cup. About all that has seemed to be practicable has been to compare all casualties apparently due to kerosene with all such in times past. Heretofore there have been so few that no summary of them has been made quarterly; they have been published in the Annual Reports. During the past quarter, however, they have increased so as to attract public attention, and, in response to a request made by Dr. Lyster, of Detroit, (medical officer of a Michigan Life Insurance Company,) a summary was prepared of the casualties apparently due to kerosene. Copies of this table, and of the replies to Doctor Lyster's questions, have been sent to each member of this Board, and a copy of the table, as amended by subsequent information, is submitted herewith. From the table, it may be seen that the number of casualties during the past quarter is more than twice as great as the average number per year, during recent years. At this rate they would be increased to more than eight times as many as under the preceding law. However, the deaths from this cause have not, thus far, increased in so great a degree as have the fires; and they still fall far below the numbers caused by the dangerous communicable diseases. It is the horrible nature of the deaths which demands attention.

Table exhibiting Casualties believed to be consequent on the use of Kerosene Oil in Michigan during the three months, July 1 to October 1, 1891, notice of which has been received at the Office of the State Board of Health, and the probable occurrence of which has been confirmed by oil inspectors or health officers. In some of these instances there seemed to be gross carelessness.

Date of Occurrence, 1891.	Where occurred.	Nature of Casualty.
July 17	Kalamazoo	House burned; fire caught from an oil-stove.
July 27	Kalamazoo	Lamp explosion.
July 28	881 Gratiot Ave., Detroit	Lamp explosion.
Aug. 4	948, corner of Chene St. and Hancock Ave., Detroit	Lamp explosion.
Aug. 6	Athens	Street lamp; health officer says no explosion, pieces found near, thinks lamp was tipped up by some person.
Aug. 10	Benton Harbor	Child burned to death while lighting a fire (oil can placed on stove).
Aug. 16	Albion	Lamp explosion.
Aug. 16	Holland (in Grace Episcopal church)	No explosion, but lamp tipped and oil spilled on floor.
Sept. 5	Lansing (Walker's grocery)	Lamp explosion.
Sept. 11	Grand Rapids	Lamp left burning near a child; child burned to a crisp.
Sept. 20	Leslie	Lamp explosion in postoffice.
Sept. 24	Pontiac	Lamp explosion, causing house to be burned.
Sept. 27	Manistee (Franklin House)	Deputy Inspector *thinks* no explosion, lamp defective, oil spilled on carpet.
Sept.	Midland	Explosion of oil in oil-stove.
	Grand River Ave., Detroit	Lamp explosion.
	Instances reported but not confirmed.	
Aug. 29	Lansing (Schultz House)	Lamps left burning, but fire alleged to be due to fire in stove and defective chimney.
Sept. 21	Republic	W. F. Montgomery fatally burned; cause of fire is not known.
Sept. 30	Kalamazoo	Lamp explosion.
July 10	Crystal Falls, Mich.	Woman fatally burned. Alleged to have occurred at Crystal Falls, found to have taken place at *Green Bay, Wis.*

This last table, made before the receipt of the report of the Fire Marshal of Detroit and of the annual reports from city, village and township health officers, was necessarily incomplete; and therefore, will be found not to accord with the completed compilations given earlier in this article.

Dissatisfaction caused by the lowering of the legal Test of Kerosene.

By the preceding three tables (5, 6 and 7) it is shown that an alarming increase in the frequency of casualties from the use of kerosene was reported to have closely followed the adoption of the new legal test in the State. This increase was so marked as to attract general public attention, and by the end of the third quarter of the year, (three months after the use of the low grade oil had been sanctioned in this State) had attained deplorable proportions, and had given rise to the expression of great dissatisfaction at, and adverse criticism of, the provisions of the new law.

This general feeling had a very beneficial influence, because of it many persons discontinued the use of the legal-test oil and returned to the use of oil similar to that previously required by law, after which the number of casualties decreased.

The following extracts from letters received at the office of the Secretary of this Board, and from newspaper reports of casualties from the use of kerosene, illustrate the dangers and the dissatiefaction caused throughout the State by the change in the legal test of kerosene, and some of the actions which resulted:—

November 28, 1891, the Secretary of this Board, received a letter from Prof. Delos Fall, member of the State Board of Health (Albion College), from which the following paragraphs are quoted:—

"Another case of bad oil here in Albion; home of Jas. Graves, Nov. 19, a lamp began 'sputtering' and finally took fire when it was carried out of doors and did no harm.

"I have had a Michigan oil tester made and by it the oil used in this case, purchased at 10 cents per gallon, flashed at 95° F. It burned in an open dish at 89°.

"Whoever argues the oil question before the next legislature will have a pyramid of dead bodies on which to stand and from which to draw illustrations."

A Caution, From the "Traverse Bay Eagle" of Aug. 18, 1891:

"We wish to caution our readers again about the new test kerosene oil. Only a few days ago a child was burned to death at Benton Harbor by the explosion of a can of this oil, and the mother was also terribly burned in her efforts to save her child. Our people have so long been accustomed to the use of oil that was safe that they have become careless. This will not answer now. The present test Michigan oil is unsafe and must be handled with the greatest care."

Caution, From the Detroit "Free Press" of Sept. 16, 1891:—

"W. P. Hutchins, of the Greenslade Oil Company, speaking yesterday of the new test for illuminating oils enacted by the last legislature, condemned it as unsafe. Up to date, Mr. Hutchins says, there is a record of sixty lamp explosions from oil of the new test, but under the old test there were only five in fifteen years. If a burning lamp filled with new test oil falls there is certain to be an accident. The oil is as inflammable as gunpowder. The danger is greater from the common use of Rochester metal lamps, which become heated quicker and acquire a temperature greater than that of the old style of lamps. Mr. Hutchins says the new test was adopted through the Standard Oil Company. The reason that governed that company was its desire to make use of Ohio oil, which under the old test it was unable to fit for illuminating purposes."

Sale and Use of Low-test Kerosene Discontinued by Some.

In consequence of the increased number of casualties, attributed to the use of the low-test oil, and the many complaints in regard thereto, many wholesale and retail dealers in Lansing, and other parts of the State, discontinued the sale of such oil.

The following paragraph bearing on this subject is quoted from the "Detroit Journal" of Sept. 17, 1891:—

"The Democratic mayor of Lansing, a dealer in oil, has taken the advice of the Journal and now advertises that he will supply oil guaranteed to come up to the former Michigan test, instead of taking the lives and destroying the limbs and property of his fellow citizens, by selling them the inflammable stuff that the last legislature imposed upon the State at the dictation and in the interest of the Standard Oil Company."

Insurance Underwriters Investigating.

From the "State Republican" of Nov. 2, 1891:—

"About thirty of Michigan's prominent fire underwriters are at the Agricultural College engaged in some very interesting experiments that will be an enlightenment on the illuminating oil question. They are the guests of Prof. Kedzie, who will entertain them with a lecture. Before visiting the college the underwriters visited various local mercantile establishments and secured samples of kerosene oil being sold. Every sample will be tested and a record made, and some interesting results are anticipated. The insurance men are all much in fear of the present low-test oil, and hope to be able to bring pressure to bear throughout the State that will cause its disuse."

Experiments by Dr. R. C. Kedzie at the State Agricultural College for the Fire Insurance Underwriters.

The "State Republican" (Lansing) of Nov. 3, 1891, contained the following account of Dr. Kedzie's tests made before the State Underwriters' Association on Nov. 2, 1891:—

"There were thirty-five members of Michigan's board of fire underwriters at the Agricultural College yesterday afternoon to listen to Dr. R. C. Kedzie's lecture on oil. The doctor prefaced his lecture by disclaiming any desire to mix in any political fight; he merely gave his lecture at the request of the underwriters' association, to instruct its members regarding a matter that entered into their daily business, a thorough knowledge of which was essential for them. As that portion of his lecture touching upon kerosene oil is the one vital point with Michiganders, that portion alone will be given. During the tests of various kerosene oils there was a quantity of high-test oil from Mayor Johnson's Lansing grocery, and a quantity of low-test oil from Representative F. A. Ferguson's Okemos grocery, and by the way, Ferguson's low-test oil, bought by Dr. Kedzie himself at the store, cost 10 cents a gallon, the same price that is paid for high-test oil, which is somewhat peculiar when it is taken into consideration that Representative Ferguson, from whose grocery it was purchased, assured the legislature during the last session that his bill in that body to secure low-test oil would be a saving of $800,000 annually in the price of oil to the people of the State, notwithstanding which he sells low-test oil at a high-test oil price.

"All during the lecture a lamp filled with the Johnson high-test oil stood on Dr. Kedzie's desk lighted. As he had talked more than a hour the oil in the lamp had necessarily become greatly heated. Suddenly blowing out the light and unscrewing the burner Dr. Kedzie lighted a taper at the gas jet, and plunging it into the oil it was instantly extinguished. He was requested by several of those present to try the same experiment with Ferguson's low-test oil, but he respectfully declined to do so as he had no desire of shuffling off just at this time. 'Here is another taper, gentlemen,' said he, after his refusal, 'and there,' pointing to Ferguson's oil, 'is some low-test oil. Any one who wants to repeat my experiment with the low-test oil has an opportunity, but first I beg that he give me a chance to leave the room.' No one seemed desirous of risking their lives in that manner, and the lecture proceeded. Tests of oil were made with both the closed cup, the use of which has been abolished by the present law, and with the Tagliabue open cup, the substitute therefor. With the closed cup the oil flashed at 100 and burned at 110 degrees; with the open cup it flashed at 110 degrees. Dr. Kedzie then tried the burning, as now conducted with the Tagliabue cup by the oil inspectors under their instructions. The oil burned at 120 degrees. When the burning taper was plunged into the oil it took fire at 120 degrees. In support of his claim that a fair test could not be made with the open cup, Dr. Kedzie conclusively proved that the vapor was heavier than air, so that even the breath of the inspector as he leaned over the cup tended to drive the vapor from the flames held to receive it, conditions all unfavorable to a fair trial. Oil is not burned in open cups by consumers,

and the only way to test it was in a closed cup where the vapor would be confined exactly as it was in the lamps in which it is used.

"The question which the courts will be called upon to decide, when either a construction of the provision of the Michigan standard policy with reference to the use of oil, or the oil law, is required of them, will be whether oil should be tested in an open or closed cup. A case can readily be made by the refusal of a dealer to pay for the inspection of oil by the present method. This would bring that question squarely before the court. From the experiments conducted by Dr. Kedzie it was clear to the mind of everyone present that a test by an open or Tagliabue cup is a delusion so far as ascertaining whether or not the use of oil in a closed receptacle is dangerous. Dr. Kedzie's lecture was reported by a stenographer engaged by the underwriters, and it will be published and distributed at their expense.

"The report of the tests made by Prof. Kedzie bears out to the letter the severe criticisms made on the law as amended by the last legislature, and supports the assertions of this paper and the State Board of Health, that the oil was dangerous and not fit to use in any household. It is worse than gunpowder, for that article will stand a test of 95° dry heat, while the new-test oil gives off an inflammable vapor when subjected to the same test."

Nature of the change in the law, explained by Prof. R. C. Kedzie.

From the Michigan "Tradesman" of Nov. 18, 1891:

"CARD FROM PROF. KEDZIE.

"LANSING, Nov. 14.—The people of Michigan ought to be thankful to the press of the State for calling their attention to the increase of danger to their persons and property by reason of the recent change in the legal test for kerosene. The change from the flash test to the burning test is equivalent to lowering the legal standard by 20 degrees F., or from 120 degrees F. flash test to 100 degrees F. This change was urged in the last Legislature on the ground that the public would get better light, have cheaper oil, and be as secure from accidents as under the old test.

"The people will learn from their own experience whether the light is as good, the oil cheaper, and their persons and property as safe as under the flash test of 120 degrees F., which has been the legal standard for a dozen years.

"R. C. KEDZIE."

Caution, From the "Grand Traverse Herald" of Dec. 24, 1891:

"There was a narrow escape from a disastrous fire on Front street, Wednesday evening, about 7:30. An exploding lamp in one of the girls' rooms at the Front Street House, set fire to the wooden ceiling at sides and top, the sides of the room being papered over the ceiling boards. The oil flew all over the room, firing it in a number of places. Quick work confined the fire to the one room. * * * *

"Again we caution our readers against the use of the low-test oil inflicted upon the state by the last legislature. There is absolutely no safety in its use."

Confirmation or Correction of Newspaper Reports.

On the first page of this article it is stated, relative to the sources of the data on which the article is based, that newspaper reports of casualties are not given full credence until after official confirmation, whenever this can be obtained. When such a report comes to the knowledge of the Secretary of this Board, a letter of inquiry in regard to it, is sent to the health officer (or other official) of the city, village, or township in whose jurisdiction the casualty is reported to have occurred, giving a synopsis of the newspaper report, and asking if the facts in the case are as reported.

The following is a sample of the letters sent on such occasions, and of the replies received:

STATE BOARD OF HEALTH, MICHIGAN,
OFFICE OF THE SECRETARY,
Lansing, November 11, 1891.

GEORGE A. HUGHES, *Health Officer of Newberg Township, Michigan:*

DEAR SIR—The following is quoted from the Vicksburg "Commercial" of November 6, 1891:—

* * * *

If practicable will you kindly inform me on the following points?

1. Was there an explosion? Answer—Yes.
2. Was there a fire? Answer—Yes.
3. Was it caused by kerosene or gasoline? Answer—Kerosene.
4. If by kerosene, at what temperature does the oil flash?
5. Please state details of any injury of person or persons.
6. Was there damage to property? How much?
7. Is the above newspaper report substantially correct. Answer—Yes.

Any other facts bearing on this subject which it may be convenient for you to send me will be thankfully received.

Enclosed find stamped envelope for your reply.

Very respectfully,

HENRY B. BAKER,
Secretary.

In further answer to the above letter, Dr. Hughes wrote, stating that the explosion was caused by kerosene, followed by a fire; that the newspaper account was substantially correct, and added:—

"The oil was Michigan test oil. Mr. Cole was just in my office, and there is no question as to the explosion."

Carelessness in the use of Kerosene.

It seems evident that some of the casualties included in the before-mentioned lists, were the result of sheer carelessness, and might have occurred with the safest grades of oil. A few reported instances of such carelessness may profitably be cited here, as a warning against the dangerous practices which led up to the casualties, and with the hope that their avoidance may insure future safety.

July 31, 1891, Dr. C. Van Zwaluwenburg, health officer of the city of Kalamazoo, in a letter to this Office, reported the following cases:

"A woman poured kerosene into a furnace. It had been burning before, and some fire remained, though she did not know it. She poured on some oil, and by the time her match touched it, there was considerable gas present, at least a flash occurred burning her slightly about the face and hands, and blowing soot out of the chimney all over the house. No other damage done."

"A day before or a day after this girl was burned, an old man in the employ of Mr. P. (who is a grocer) tried a similar experiment on the stove in the store and burned his fingers and whiskers slightly, with the same oil."

"Another furnace accident occurred exactly like the first about Nov. 15, at 422 W. Walnut St., city. The boy in this case was burned more severely about the face and hands but not so as to leave scars. No other damage done."

"A fourth accident with kerosene oil occurred at the City Hotel, about Oct. A servant girl saw the flame 'go down into the lamp,' and expecting it to explode, threw it into the hall breaking it and firing the oil. The flames were at once smothered with blankets and no damage resulted."

In this last instance, it seems to have been the dangerous nature of the oil itself which caused the trouble.

The following item is from the Benton Harbor "Palladium" of Aug. 10, 1891:—

"A loud explosion, followed by a piercing scream, startled the quiet neighborhood in the vicinity of Seventh and Oak streets about three o'clock Sunday afternoon. Neighbors quickly hastened to the scene, where the house occupied by Mr. Wm. Showwalter and family was found to be in flames and their little son, Clyde, aged seven years, frightfully burned from a kerosene explosion. The little fellow was attempting to light the kitchen fire, using kerosene oil, and in some manner probably communicated by the vapor, the flame from the match came into contact with the oil in the can and a terrific explosion followed, filling the room with fire and smoke. Mrs. Showwalter made a heroic attempt to save her child from the flames which had enveloped him from head to foot, and grasping him in her arms she tore off the burning clothes as best as she could, frightfully burning her own hands and arms. Neighbors assisted them into the house of Mr. Rome adjoining, and Drs. Bastar, Tutton and Bell were summoned. The physicians did everything possible for the little sufferer, who was burned beyond recognition, portions of the cuticle on his limbs, body and face being entirely burned away. After lingering in great agony the little fellow died about 7:30 o'clock.

"Had it not been for the prompt assistance of neighbors the fire would have probably proven a serious conflagration owing to the extreme dryness of the frame buildings in the vicinity. As it was a few buckets of water quickly checked the spread of the flames."

The "Detroit Journal" of Oct. 14, 1891, contains the following paragraph:—

"Nellie Whithey, of Port Huron, 6 years old, was yesterday locked in the house by her mother, who went away to do some washing. She tried to build a fire, using kerosene, when her clothing caught the flames. She died soon after."

The following item is quoted from the "Detroit Free Press" of Feb. 23, 1891:—

"*A Mother and Her Child Lose their Lives in a Peculiar and Distressing Manner.*

"SAGINAW, February 21.—Mrs. John Burns, residing on Astor street, whose husband is in the employ of the Flint & Pere Marquette Railroad, and with her infant child, were fatally burned this evening by her own carelessness in attempting to clean the floor of some kerosene that had been accidentally spilled, by touching a lighted match to the oil."

(Copy.)

"*Detroit, August 10, 1891.*

"*John O'Brien, State Inspector Illuminating Oil, Jackson, Mich.:*

"DEAR SIR:—I beg leave to report to you the case reported in the Sunday morning papers here of a lamp explosion which occurred at 948 Cor. Chene St. and Hancock Ave. The result of my investigation on the morning following the explosion (Sunday morning) is as follows:—

"It was the occasion of a 'saloon.' A dance was in progress up stairs in hall over saloon. The lamp was suspended (improvised) over the head of the stairs to light the hall with. A screw was put through the ceiling, and in place of the screw entering a scantling or something substantial, it simply entered a *lath* in the ceiling, and the swaying motion caused by the vibration of the floor loosened the screw, and the lamp fell on the stair, broke, and set the stairway afire. It was badly charred. Fire department called, but extinguished before their arrival. No other damage except the burning of the stairway. I got a sample of the oil used, and it ignites at 123°. It was unquestionably a clear case of carelessness.

"Very respectfully yours,

J. D. LONG, *Deputy Oil Inspector, Detroit, Mich.*

"P. S.—In the case of 881 Gratiot Ave:—The oil was purchased of a small peddler who claims he got his oil of the Standard people, and since the *new test*. Have a sample of oil and burns at 122. Proprietor admits carlessness and lack of knowledge on part of boy who took care of the lamp. It was suspended *directly* over *billiard table*, where playing was going on, and may have been hit with a cue, but can't say.

"In the case of 56 Grand River Ave. no reason can be given. Folks were asleep and lamp stood on the table in same room. Can't find out where they got oil. Could not get sample.

"J. D. LONG, *Dep. O. In.*"

Threats of Abolishing the State Board of Health.

The following letter was sent by the Secretary of the State Board of Health to the Members of the Board:—

"*Lansing, Mich., Sept. 16, 1891.*

"*To the Members of the State Board of Health:*

"GENTLEMEN—The following copy of a letter to the Detroit Free Press is sent to you in order to correct a false impression: * * * *

"*Lansing, Mich., September 11, 1891.*

"*To the Editor of the Free Press:*

"SIR—On page 3 of your paper yesterday, in referring to the proposed reduction of the standard of kerosene oil, last winter, you say: 'Dr. Baker, the Secretary, had been warned not to interfere if he valued his tenure of office. On that ground he asked Prof. Kedzie to be silent.' There are three errors in the above statement, which I hope you will correct. 1—I never heard any threat against my 'tenure of office.' 2—On that ground I never 'asked Prof. Kedzie to be silent' on the subject of kerosene oil. 3—I never asked him to be silent on that subject, for any reason whatever.

"I presume the errors have arisen from my conversation with Prof. Kedzie when he came to my office for information just after he had been invited by Senator Wilcox to present the subject of oil inspection before the Senate Committee. I gave him all the new facts in my mind at that time, including a statement that prominent persons had just been reported to have said that if Prof. Kedzie appeared for a continuance of the standard, they would abolish the State Board of Health, they apparently considering Prof. Kedzie still a member of the State Board of Health. I had no thought that the statement of that fact would influence him, in the slightest degree, not to accept the invitation to appear and give evidence. It seems that it did not, and that he presented the subject.

"Very respectfully,

"HENRY B. BAKER."

But Professor Kedzie's advice was not accepted by that legislature; on the contrary, it listened to and acted on the advice of a person actually but not openly working for the Standard Oil Company. And that person was the same one who told the Secretary of the State Board of Health that three leading members of the legislature (whom he named) had said that the State Board of Health would be abolished if the success of the bill to reduce the test on oil was interfered with. Inasmuch as the Governor had recommended the abolition of the Board, his statement seemed to be probably true.

Oil Inspection.

October 13, 1891, the Secretary of this Board, wrote to Hon. John O'Brien, State Oil Inspector, as follows:

"DEAR SIR:—Will you kindly inform this office on the following points:

"1. What number of tanks have been inspected in Michigan by deputy oil inspectors since July 1, 1891?

"2. What has been the average burning test of the oil inspected?

"3. How much of the oil was up to the test under the preceding law?

"Any other facts, of interest to the people of Michigan, bearing on this subject, which it may be practicable for you to send, will be thankfully received."

To the foregoing letter the Hon. John O'Brien, replied Oct. 15, 1891, as follows:

"DEAR SIR:—Yours of Oct. 13, inst. at hand. The number of tanks inspected since July first cannot well be told, as Inspectors report only the number of bbls. inspected. 65,044 being the number since July first.

"Deputies are not required by inspection law, to report flash or fire test of oil inspected. Consequently am unable to state the average burning test since July first.

"You ask concerning average test under later law. As I have not yet seen the State Inspectors' last report am unable to give you this information."

Personal Injuries Consequent on the Use of Kerosene.

The details of personal injuries are stated in the last two columns in the tabular lists of casualties, on preceding pages.

The following extracts from correspondence of this office, and from newspaper items which came to the notice of the Secretary of this Board, give in detail, the circumstances connected with some of the casualties from the use of kerosene, which resulted in loss of human life and other personal injuries to citizens of this State in 1891:

December 21, 1891, A. H. Johnson wrote to the Secretary of this Board from Detroit as follows:

"Yours of the 7th instant pertaining to the death of the late Abbie Reithhard, kindly received and in reply would say first there was no explosion. I learn that she had been ironing and that the kerosene oil gave out. She filled the stove, some oil spilling on the outside, at the same time; she lit the stove not thinking or paying any attention to the oil on the outside, and the whole thing took fire at once and she in her excitement grasped the stove to carry it into the back yard, pressing it at the same moment against her clothing, which, being saturated with oil from the burning stove, took fire also and she was burned as you see stated in the 'News' of July 17, 1891, except that the finger nails were not burned off. As to the temperature at which the oil burned, I am not able to say."

The following paragraph is from the "Detroit Tribune" of Sept. 12, 1891:—

"GRAND RAPIDS, Mich., Sept. 11.—The two-year-old son of Tunnis DeHann was burned to a crisp in a fire that partially destroyed his house tonight and the democratic legislature can be justly charged with the tragedy. The little boy was sent early to bed to his room upstairs and to cheer the child in his loneliness a lamp was left burning on the table. It is thought the little fellow left the bed and began playing with the light and knocked it off the table. An explosion was heard by the parents below. The mother endeavored to reach the room but was driven back by the dense smoke and had to be restrained from rushing to certain death to rescue her child. When the fire was finally extinguished Captain Corwin of the department found the body of the boy crouched in a corner burned beyond human semblance. The family came here four months ago and the father is a common laborer. The loss on the house is $400 and on the furniture $200. The low grade oil is undoubtedly responsible for the fire and the death of the child."

Fatal Burning at Detroit.

The following is quoted from the Detroit "Evening News" of October 7, 1891:—

"An explosion resulting in the death of one man and probably fatal injuries to another occurred at the house of George W. Liber, 73 Piquette avenue, about 11 o'clock this morning.

"Yesterday Mr. Liber received a zinc tank containing a barrel of fuel oil. The tank was placed in the kitchen. This morning it was found that the tank leaked, and during the night the oil from it had saturated the floor of the kitchen. Mrs. Liber sent word to Burlingame & Curtis, dealers in stove burners, etc., at 299½ Woodward avenue, to have the tank repaired. Sheldon A. Burlingame, senior member of the firm, and George S. Duncan, an employé came to Liber's to do the work.

"The tank had been taken out of the kitchen and was placed in the back yard in a corner between the house and the fence. Without taking the precaution to empty the tank the men set to work. Burlingame

bent over the tank with a red-hot soldering iron. Scarcely had he touched the leaking spot with the iron, when a terrific explosion took place. A piece of the tank struck Burlingame in the head, spattering his brains over a shed 20 feet away. His clothing was soaked with oil, which was set ablaze, and the corpse lay on the grass, burning like a log. It was not until several minutes later that some of the neighbors extinguished the flames.

"Curtis was thrown about 20 feet, and over a fence three feet high. His clothing also was afire, and he ran from the spot up the alley, across John R. street and into a vacant lot at the corner, screaming with pain, the wind fanning the flames. He threw himself on the grass and rolled about in agony. Mesdames Julia Horton and M. W. Beecher ran out with carpets and quilts, and rolling Duncan up, soon extinguished the flames. Duncan was then carried into a house until Grace hospital ambulance arrived, when he was taken to that institution and placed under the influence of anesthetics to alleviate his pain. His clothing had been burned off, and the skin also came off in large pieces. He is not expected to recover.

"Mrs. Liber was in the kitchen doing household work when the explosion took place. The shock knocked her to the floor unconscious. The house took fire and the flames rapidly ran along the oil-soaked shed. Mrs. Liber recovered consciousness just in time to escape the flames, and dazed and helpless was taken to a neighbor's house. A fire alarm was turned in and the flames extinguished, but not until about $200 worth of damage had been done.

A Burning Lamp Without a Chimney, or With a Broken Chimney, is Dangerous.

An ordinary kerosene lamp burning without a chimney is known (since 1877) to be a source of danger, being liable to cause an explosion in a few minutes, because of the heating of the wick-tube and the collar of the lamp. An account of experiments demonstrating this, is published on pages lxxv–lxxvii, of the Report of this Board for the year 1877. The following casualty, at Kalamazoo, reported by the health officer of that city, seems to be in conformity with those experiments:

"July 28, Mrs. Fletcher left a lamp burning without a chimney; she says it was burning low, as she had used it that way before leaving it, and had not left it immediately after lighting it. It exploded after burning about ten minutes. This oil was also tested by Mr. Cole, and found to be fully up to the old test, flashing at 125–126 F."

Explosions not the Only Danger from the Use of Light Oils.

It has been demonstrated, by the foregoing tables, etc., that the number of *explosions* of kerosene in lamps, lanterns and stoves in this State, increased in the last six months of 1891, with the use of low test oil. Such explosions, however, do not constitute the only danger which may arise from the use of light oil. Casualties consequent on the accidental breaking of lamps, spilling of oil, etc., recorded in the lists of casualties given in this article, might not have occurred had the oil used been of the higher grade formerly in use.

The following paragraph, which Dr. A. Post, health officer of the city of Ypsilanti, writing to the Secretary of this Board, November 19, 1891, confirms reported details of a casualty probably of this kind:

"Later reports of yesterday's fire show that Mrs. Dole was badly burned; her face, hands and neck being blistered. She had just filled the *kerosene* oil-stove and then lit it, and as she thought it was burning up too high, she turned the wick down and the oil took fire immediately. The furniture, carpets, etc., were on fire in an instant. Although the fire was soon put out much damage was done to the house and furniture. Mrs. Dole was taken to Mrs. Barney's were medical aid was summoned and every attention given that could relieve her terrible suffering."

INJURIES AND LOSS OF PROPERTY ALLEGED TO HAVE BEEN CAUSED FROM THE USE OF GASOLINE IN MICHIGAN IN 1891.

In 1891, as in former years, an effort was made, at the office of the Secretary of the State Board of Health, to collect facts respecting every casualty attributed to the use of gasoline, in Michigan, which came to notice. During the year there were received at the office of the Secretary of the Board reports of 29 casualties in different parts of the State, alleged to have been caused by gasoline, with attendant losses of property and personal injury, as follows: One man badly burned, and one man slightly burned: damage to property, $7,329.00.

Of these 29 casualties reported, there occurred in the city of Detroit 25 casualties with loss of property amounting to $7,329.00; in the city of Lansing, 1 casualty without reported injury to person or property; in the village of Highland Park, Wayne county, a gasoline stove exploded, amount of damage not reported; in Bay City, one fire resulted from the use of a gasoline stove, particulars not given; in the city of Port Huron, " a gasoline stove took fire, from filling, no one severely burned."

The Source of danger in the use of gasoline.

The use of gasoline requires especial care, as it vaporizes when exposed to the air, and this mixture of air and gas is very explosive. Accidents often occur where the gasoline has been spilled in filling the stove; by the time the match is struck to light the burner, the air is full of the gas, and an explosion may occur.

In the above list of casualties in Detroit, a woman is reported as carrying an open vessel to the gasoline stove when it ignited; also, an instance where a coachman was using gasoline to kill moths in furniture, when it ignited, burning him slightly, and causing damage to property, amounting to $3,000.

There are numerous instances where explosions, and fires, have resulted from its use in cleaning clothing, etc.

The reason for the great danger in the use of gasoline is that at ordinary temperatures gasoline vaporizes and moves rapidly, so that in case there is a fire or a light in its vicinity there is liable to be an explosion of the air mixed with the vapor of gasoline. Casualties sometimes result from accidental sparks, as from stepping on a match while using gasoline.

The following list of casualties in Detroit, and extracts from communications received from correspondents, together with clippings from newspapers, give what details could be learned in regard to the above-mentioned casualties:

Casualties in Detroit during the year 1891, believed to have been consequent on the use of Gasoline, information of which was received at the Office of the State Board of Health. [*Reported by Wm. H. Baxter, Fire Marshal of Detroit.*]

Month. 1891.	Street and Number.		Nature of Casualties, Persons injured, etc., etc.	Amount of Damage.
	Street.	Number.		
March 2	W. Congress	56	Stove exploded	$155 00
" 20	Park Place	54	" "	5 00
April 15	Antietam	106-8	" "	232 00
" 24	Fourth Ave.	405	" "	5 00
May 15	Ash	210	" "	60 00
" 17	Napoleon	15	Plumber's furnace exploded	70 00
June 5	Gratiot Ave.	1147	Stove exploded	10 00
" 26	Washington Ave.	54	Plumber's furnace being used in alley at rear of this number exploded	00
" 27	Scott	60	Stove exploded	10 00
Aug. 2	E. Congress	238	" "	00
" 7	"	296	Stove overflowed	00
" 10	Jefferson Ave.	187	Used in an open torch under awning, set fire to awning	25 00
Sept. 5	Meldrum Ave.	369	Stove exploded	20 00
" 6	Woodward Ave.	703-5 707-9	" "	2,183 00
" 12	Gratiot	1220	" " (Man badly burned.)	75 00
" 15	24th street	451	" "	30 00
" 17	14th Ave.	1086	Woman carrying open vessel to gasoline stove and it ignited	00
" 17	Maple	313-15	Children playing with matches set fire to can containing three gallons	290 00
" 21	"A" street	11	Stove exploded	10 00
" 24	Woodward Ave.	546	Coachman using gasoline in barn to kill moths in furniture, ignited. (Coachman slightly burned)	3,000 00
Oct. 7	Grand River Ave.	454	Stove exploded	481 00
" 9	14th Ave.	123	" "	10 00
" 13	Wabash Ave	349	" "	20 00
" 15	Baker	392	" "	10 00
Nov. 18	Michigan Ave.	373	" "	528 00
Total				$7,329 00

Fire due to gasoline in Detroit.

November 21, 1891, the Secretary of the State Board of Health wrote the following letter to the Chief of the Fire Department, of Detroit:

"DEAR SIR—The following is quoted from the Detroit 'Free Press,' of November 19, 1891: 'At 8:10 P. M. an alarm sounded from box 312. A gasoline stove tipped over in Henry J. Hobb's saloon, 373 Michigan Ave., and the department had lively work for a time. The building was owned by the Farnum estate, and $300 will cover the damage.'
If practicable, will you kindly inform me on the following points?
1. Was there an explosion?
2. Was there a fire?
3. Was it caused by kerosene or gasoline?
4. If kerosene at what temperature does the oil burn?
5. Is the above newspaper report substantially correct?
Any other facts bearing upon this subject which it may be convenient for you to send to me will be thankfully received."

The above is a copy of the hektographed letter sent to health officers or fire wardens, requesting information in regard to reported casualties, where the report is of doubtful accuracy.

In reply to the Secretary's letter, Wm. H. Baxter, Fire Marshall of Detroit, wrote on November 24, as follows:—

"Your letter of the 21st inst., addressed to the Chief of the Fire Department, being sent to me for reply, I have the honor to state:

"The newspaper report quoted by you is correct except in one particular. The gasoline stove did not tip over. Hobbs, during the temporary absence of his wife, was endeavoring to operate the stove, and failed to shut off the supply for the generator, hence the fire.

"1. As soon as the flames reached the tank attached to the stove there was an explosion.

"2. There was a fire which thoroughly gutted the saloon.

"3. $300 will probably cover the damage to the building.

"4. Hobbs had no insurance, and his loss is estimated at $600."

Lamp Explosion, due to Gasoline, in Lansing.

The "State Republican" (Lansing), of Oct. 5, 1891, contained the following item:—

"A hanging lamp in the house of A. S. Eggerts, 110 St. Joseph street east, exploded Saturday night, but the blaze resulting was extinguished before the fire department arrived."

Dr. Brucker, health officer of Lansing, reported as follows:—

"The lady of the house sent after kerosene and received gasoline instead, and filled the lamps with the gasoline. The lamps worked unsuccessfully for a few days, which was thought to be due to poor oil. After the explosion they cleaned out all the lamps, and then found that they had been filled with gasoline instead of kerosene. They found that the grocer had charged them with gasoline, so they concluded that the mistake was made in giving the order."

CASUALTY CONSEQUENT ON THE USE OF NAPHTHA IN MICHIGAN, CALENDAR YEAR 1891.

During the year 1891, there was reported to the office of the Secretary of the State Board of Health, one casualty in the State, caused by the use of naphtha, with consequent loss of one life, and damage to property amounting to $150.00.

The above-mentioned casualty occurred in the city of Detroit, and from the Fire Marshal's report we quote the following statement relative to the fatal burning, and damage to property:

"Material being used in cleaning furs, took fire from an adjacent light. Operator A. S. Meddaugh, fatally burned. Amount of damage by fire $150.00."

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ERRATA.

Page xliii, in second sub-head, for FOR PRINTING THE SUPPLEMENT FOR THE FOUR SANITARY CONVENTIONS HELD IN 1890, read, EXPENSES FOR THE FOUR SANITARY CONVENTIONS HELD IN 1890.

Page 29, in fourth line of heading of Table 16 near end of line, for *six Years, 1884-89*, read, *six Years 1885-90.*

Page 45, in first line in nonpareil type under Exhibit 26, for W. G. Gates, M. D., read, W. C. Gates, M. D.

Page 89, in third line of heading to Exhibit IV., for *five, 1886-90*, read, *five years, 1886-90.*

Page 119, in second line of heading to Exhibit XI., near end of line, for, *thirteen years*, read, *fourteen years.*

Page 153, in head line of Table 5, end of line, for *1894*, read *1891.*

Page 156, in third paragraph from bottom of page, last line near end of line, for *Herbert E. Foster*, read *Herbert E. Foster, M. D.*

Page 159, in column under Secondary Localities, under Wayne county near bottom of page, for Bedford township, read Redford township.

Page 184, in third paragraph of long primer, first line for Austin, Sanilac county, read Austin township, Sanilac county.

Page 194, in last line of nonpareil italic, for *J. E. Scallon*, read, *J. E. Scallon, M. D.*

Page 195, in second line of nonpareil italic, for *Ceresco, Calhoun county*, read *Ceresco, Marshall township, Calhoun county.*

Page 197, in column of Primary Localities, under Grand Traverse county, for Monroe Centre, read Monroe Centre, Bear and Green Lake townships.

Page 198, in column of Primary Localities, under Lapeer county, for Lenawee city read Lapeer city.

Page 205, in third line of long primer, for Dr. H. F. Zigler, read Dr. H. F. Sigler.

Page 205, in first line of copy of a letter, for Dr. H. F. Zigler read Dr. H. F. Sigler.

Page 225, in column of Secondary Localities, under Sanilac county, for Bridgehampton village read Bridgehampton township.

Page 238, in column of Secondary Localities under Macomb county, for Rome village, read Romeo village.

Page 239, in last line on page, for *South Branch, Wexford county*, read *South Branch township, Wexford county.*

Page 255, in first line on page, end of line, for Torch Lake, read Torch Lake, Houghton county.

Page 279, in last paragraph of long primer, first line, for A. F. Turner, M. D. read F. N. Turner, M. D.

Page 279, in last paragraph of long primer, near end of line, for LeRoy township, read LeRoy township, Ingham county.

Page 281, in third line of long primer, near end of line, for Ashton, Osceola county, read Lincoln township, Osceola county.

Page 281, in first italic sub-head, for *Ashton*, read *Lincoln township.*

Page 281, in third paragraph of long primer, second and third lines, for village of Ashton, read township of Lincoln.

Page 281, in last italic sub-head, for *DeWitt* read *DeWitt township.*

Page 281, in first and second lines under last italic sub-head, for Dr. Lorenzo E. Warden, health officer of DeWitt, read Lorenzo E. Warden, health officer of DeWitt township.